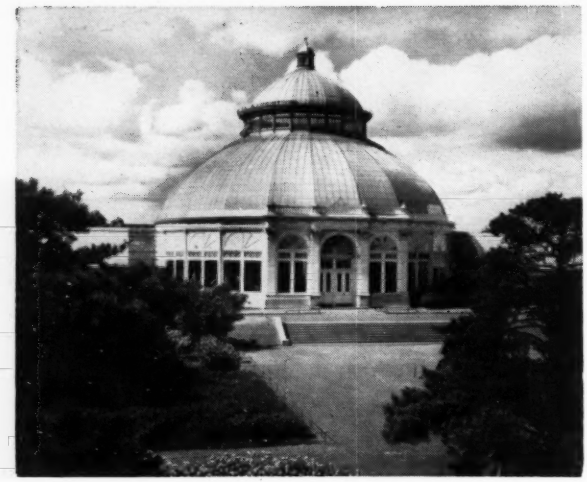
THE GARDEN JOURNAL

OF THE NEW YORK BOTANICAL GARDEN



Educational Program, Winter 1956 Term, starts January 5, 1956, with class in Flower & Vegetable Gardening—H. E. Downer, Instructor.

Saturday Afternoon Programs—3:30 p.m., Lecture Hall, Museum and Administration Building.

International Flower Show, former John Wanamaker Dept. Store, March 11-17, 1956. Be sure to see The New York Botanical Garden's exhibit of annuals.

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DOROTHY EBEL HANSELL
Editor

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AMONG OUR CONTRIBUTORS

A. C. PFANDER is Administrator of The New York Botanical Garden with lifetime experience in garden design and construction ... FRED F. ROCKWELL and ESTHER C. GRAYSON are a very popular husband-wife horticultural team. Fred Rockwell is Senior Editor of Flower Grower, Esther Grayson is a well-known flower arranger. Together they have written a number of fine gardening books; among the more recent, *Complete Book of Annuals, Complete Book of Bulbs, Complete Book of Flower Arrangement*... DONALD P. ROGERS, Curator of The New York Botanical Garden, became a truffle-hunter under the tutelage of Dr. Heien Gilkey in Oregon where truffles are abundant enough to be smelled out by educated human beings . . . MARGARET ELIZABETH URBANI, the wife of Paul A. Urbani, the principal American importer of truffles, has for a long number of years been studying, experimenting with and teaching the fine art of truffle cookery . . . DR. A. B. STOUT, Curator Emeritus of The New York Botanical Garden, has contributed immeasurably to the development of new varieties of daylilies, grapes, and other plants . . . LARUE SPIKER grew up in a small town in northcentral Illinois where she roamed the woods and fields. Now living on a wooded hillside near a small lake, fifteen miles east of Louisville, Kentucky, Miss Spiker pursues her hobby—nature study—while engaged professionally in writing . . . DR. RICHARD M. KLEIN is Assistant Curator of The New York Botanical Garden . . . OTTO and ISA DEGENER make up another husband-wife team, both being botanists; Dr. Degener is Collaborator in Hawaiian Botany of The New York Botanical Garden and author of several books on Hawaiian plants . . . G. CARL BALL is one of the three sons of the founder of George J. Ball, Inc. His practical knowledge of horticulture gained through working with his father has been supplemented by University training in the plant sciences . . . WYNDHAM HAYWARD is proprietor of Lakemont Gardens in Winter Park, Florida, specializing in sub-tropical bulbs and plants; Regional Vice President of the American Plant Life Society and Secretary of its affiliate, the American Amaryllis Society . . . GERTRUDE B. FOSTER is Editor of Herb Grower Magazine.

CREDIT FOR ILLUSTRATIONS

We are indebted to the Special Display Committee—Mrs. Charles Burlingham, Mrs. Richard Meredith, Mrs. Donald B. Straus—for the selection of the front cover illustrations of The Garden Journal. The front cover illustration this month is from **La Belgique Horticole,** Vol. 1, 1851. Photograph of original plate by E. N. Mitchell. Pp. 3, 4, F. F. Rockwell; p. 5, A. C. Pfander; p. 6, E. N. Mitchell; pp. 9, 10, A.B. Stout; p. 11, Farr Nursery Co.; pp. 12, 13, 14, 15, J. Horace McFarland Co.; pp. 16, 17, upper, Gottscho-Schleisner for Lord & Burnham Co., lower left Gottscho-Schleisner, lower right, Roche; p. 18, Roche; p. 21, E. N. Mitchell; p. 23, Margaret Titcomb; p. 25, George J. Ball, Inc.; p. 27, Wyndham Hayward; p. 30, Wayside Gardens.

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We are introducing two new features of The Garden Journal in the first number of 1956 — "From Mud to Marigolds — Know How to Do It," and "Know What to Do." The first, as the author explains, is intended for the young owners of a new home on an undeveloped lot; the second is for all amateur gardeners.

We shall appreciate our readers' comments, for they will let us know how these features are received and guide us for future issues.

Perhaps you who are seasoned gardeners may know young home owners to whom "From Mud to Marigolds — Know How to Do It," will prove a valuable aid in developing their properties. If you will send their names, we shall be glad to mail them a sample copy of this number of The Garden Journal. — THE EDITOR.

FROM MUD TO MARIGOLDS

Know How To Do It

By **A. C. Pfander**

THE FOLLOWING is directed primarily to the young couple who with rare good sense or in sheer desperation has acquired a house with a short lot and a long mortgage — with soil around the residence which resembles a sea of mud and makes one's heart sink into his boots, when trying to create any semblance of a garden.

Nevertheless, and in spite of all adverse conditions, we shall help you to make a garden with a really creditable appearance the first year. We shall go through all the phases to give you an outstanding, permanent landscape job at the lowest possible price, a price which even a very lean budget can swing. We shall place the emphasis on maximum return for every dollar spent —in other words, minimum outlay for the greatest possible permanency.

We shall give ideas on practical and decorative landscape designs and make recommendations on the plants suitable for permanent satisfaction. We shall give step by step instructions on the planting and on the care of the plants selected; we shall work for a balanced planting which is attractive even in the winter months. We shall consider first things first, for example, soil conditioning, so that a self-respecting plant will have a chance for normal development. There are no short-cuts, but any soil can be brought into good condition over a period of time. We shall attempt to select those plants which give accent to the dwelling in general, the entrance, the corners, the picture window in particular. We shall stress the importance of exposure—north, south, east, and west; the plants for protected spots, and the plants that will withstand the brunt of north and northwest winds. All this is not nearly as complicated as it may sound, but will unfold itself in an easy, understandable manner as we go along.

Today the garden is important—outdoor living is widely accepted. People prefer to enjoy the things of nature on their own property rather than to travel, bumper to bumper, over crowded highways. A well-planned garden serves as the outdoor living room the greater part of the year, and the feeling of comfort in sun and shade can be happily achieved. The young couple who succeeds in making the house and garden a complete unit for easy living will get the greatest return from every dollar invested in their undertaking.

The more basic the decisions you make at the very beginning, the more carefully your over-all plan can be developed, and the sooner you will enjoy the results of good planning.

When you furnish a home, you take infinite pains to select furniture which will suit your needs and satisfy your esthetic sense. You strive for harmony in carpets, draperies, pictures, and other decorative accessories, so much so that in the finished product (if ever there is such a thing) your personalities are reflected to a marked degree.

Furnishing the home is a comparatively simple matter—a complete set of rooms is ready for your choice, and you have only to add the intimate, personal articles. Even the rooms of the house are arranged according to the architect's conception of comfortable living. With the garden however, you are faced with an altogether different problem. You have to start from scratch.

What kind of garden will suit your needs and desires?

Are you hobby gardeners? Should we draw up plans to include as great a variety of plants as your property will allow?

Do you like to entertain and have week-end guests? Do you want the kind of garden that lends itself to easy living, with attractive appearance and minimum maintenance? Do you want to do the necessary work yourselves or engage a nursery or neighboring landscape service to do it? How much can you afford?

Are you primarily concerned about a play area for your children and their friends, and just want the grounds to look moderately attractive without going overboard on care and special show?

Are you a young business couple, seeking the most in efficiency in both the home and the garden?

Or are you a combination of several

of these people, struggling with a complexity of needs and desires on a modest budget?

Let's pause and think for a minute! Is not the garden part of the home? Don't you spend months of the year in the open? Should not the garden, therefore, be made with the utmost in good planning (mind you, we did not say the utmost in expense!) to provide a large share of the outdoor living you so greatly enjoy? The most serious and most costly mistake in gardening is impatience. With patient, careful planning you can acquire in a relatively short time a well-landscaped, functional outdoor living area, one of which you may be proud and at a cost which will fit into a modest budget.

There is a plant for every need, the knack is in the right selection. If you go to a nursery and ask for an evergreen at a low price, you are very apt to get a spruce which in a few years will tower over the first and second-story windows, or hide the front entrance. But if you know what you need for permanent good appearance and shop for it, you will not only have the satisfaction of accomplishment but, in most cases, will add to the value of your property.

Let's consider only the best plants suitable and if necessary start with very small ones. They grow quickly and give infinitely more satisfaction than cheaper or larger plants which may not be suitable.

Let's hold a family conference to decide the kind of evergreens and other shrubs for the planting around the house and for the backbone of the garden.

Let's buy a good plant for an anniversary or birthday or other special occasion when a present may be in order. This is a nice sentiment and gives memory-value to the garden.

Let's plan your planting scheme so it will look good on your neighbor's side. It is friendly, reflects favorably on you, and makes for gracious living. Besides it does not cost anything extra.

Let's not abandon a good project just because your budget is sometimes hard pressed and you seem to have stretched it to the limit. We shall plan economically for the interim and wager

(Continued on page 5)

Know What to Do

January—

Now that the excitement of the holidays has passed, we can pick up where we left off with our plants and gardens. As Christmas gift plants are forced, most of them have to be discarded after they have finished flowering. Poinsettias and azaleas are among those which can be saved.

After the leaves on poinsettias have turned yellow and fallen off, the plants are ready for a rest. Cut the stems back to within six inches of the base and store them in a dry place, with a temperature range of 50°-60°, until May or June. If you have a small greenhouse, you can tuck them out of sight under the benches.

The secret in keeping azaleas is never to let them get really dry—be sure to water them freely while in bloom—and seldom to repot. During summer, sink the pots in a shady spot.

During winter, house plants deserve some extra attention to recompense for the artificial conditions under which they must live. Syringe them with clear, room-temperature water—they breathe better when dust is washed off their leaves. You can use a bulb syringe ("Centrospray") or the spray attachment to the faucet in kitchen sink or bath tub. This spraying also keeps down red spider, aphids, and mealy bugs.

Don't throw away or burn your dismantled Christmas tree (you can buy Christmas trees after the holidays "for a song") but use the branches to protect choice plants. This type of winter covering — boughs of hemlock, pine, spruce, cedar—is particularly useful in the rock garden. It is also good covering for the rose garden, after the ground has frozen and soil hilled around the bushes.

When the ground has frozen hard—and not before—is the time to furnish winter protection. It is the alternate freezing and thawing of the ground which heaves plants, especially shallow-rooted ones, that causes all the trouble and not low winter temperatures. If you live in an area where snow covers the ground consistently, you are not bothered by the chores of winter covering. Another reason why you should not put littery material such as salt hay, straw, leaves around plants too soon—this material attracts field mice and other rodents and they play havoc, too.

Remove snow, if it falls heavily, from evergreen trees and shrubs by shaking the branches gently or by tapping them lightly with a wooden or bamboo lawn rake. Snow should be removed before it weighs down the branches to the breaking point. However, if the snow freezes or ice forms, don't attempt to remove it—wait for a thaw.

You won't find winter so formidable and your garden fun will not seem so many months away, if you spend some time browsing through the catalogs. You will doubtless want to order old plant friends, tried and true, which you know from previous experience you can grow successfully. But do introduce some new things each year. There's a stimulus about trying to grow something new, something different, even something difficult. It's a challenge to your skill and ingenuity to satisfy the requirements of a plant considered "not an easy doer."

Keep the bird feeding stations filled with seeds—how the cardinal relishes sunflower seed—and never let the suet rack hang empty. The downy woodpecker, juncoes, nuthatchers, chickadees, brown creepers, tree sparrows feast upon it. Food should always be handy for our feathered friends in winter — especially when snow covers the ground. And once you start to feed birds, you must continue—they count on it, return regularly to the feeding stations, and you can't let them down!

Try to force forsythia, flowering quince, crab, peach, plum, in a tub or pail of water in a warm location. As the buds begin to show color, put the branches in suitable containers and place

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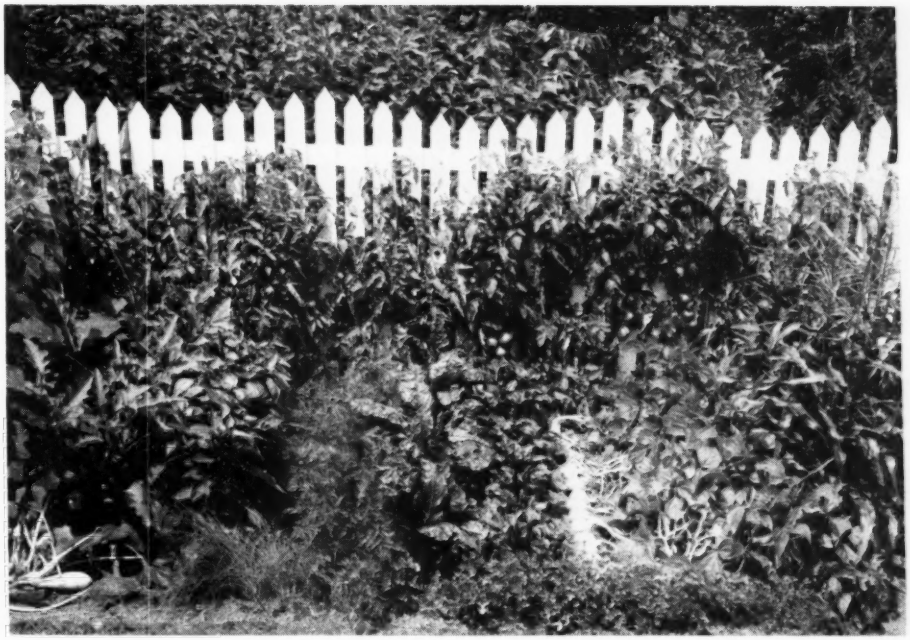
YOU CAN GROW VEGETABLES

By F. F. Rockwell
and
Esther C. Grayson



This vegetable plot, only eight by fourteen feet, produced close to two hundred pounds of food

Tray of vegetables picked from the above garden

IT'S REMARKABLE how many delicious home-grown vegetables you can get during one growing season from even a very small patch of land.

Though we have grown vegetables extensively during most of our lives, we have also had very successful small vegetable plots which prove conclusively that any suburban home owner can grow his own if he wishes to.

The garden in the accompanying illustration, for instance, covered a space of only eight by fourteen feet; yet the tray of vegetables in the other picture, we actually picked from it on the day both photographs were taken. You can see that there was plenty more waiting to be harvested. In fact, during the entire season this garden yielded very close to two hundred pounds of food.

This past summer, our small vegetable patch on Cape Cod measured fifty by twenty-five feet and from it we had onions, peas, beets, and lettuce for ourselves and we amply supplied four families throughout the summer with tomatoes, squash, beans, and Swiss chard. We even grew two rows of potatoes and harvested a bumper crop.

HAVE A PLOT PLAN

For the average suburban lot, an ideal size for the small vegetable garden is about twenty-five by fifty feet. Usually there is space enough for such a plot beside the house, if the lot is not deep enough to place it in the rear. For the home grounds of modern size, it is a good plan to border the vegetable plot with flowers in a bed eighteen inches wide and to run a two-foot path of turf down the center. This gives you two beds fifty feet long and ten feet wide for the vegetables, with a border of bloom which "takes the curse off it" and makes the whole area a really decorative garden feature.

You may naturally find it necessary to change the dimensions suggested above to suit the space you have available, and you will, of course, grow the vegetables which are favorites with your family. We suggest you work out your own plot plan *on paper* as soon as you have measured and decided upon the space you want to devote to vegetables, and *before* you break ground.

There is usually little choice of location on a small lot, but place the vegetable plot where the plants will get as much sun as possible. A southeast exposure is ideal. The roots of large trees will take nourishment from the soil, so avoid planting over them if you can.

And remember, vegetables should be watered in dry spells, so locate the plot within reach of the hose.

PREPARATION OF THE SOIL

Once you have your plan on paper, stake out the plot with stakes and string. If the ground is already in lawn, the central grass path can be left undisturbed and only the two planting areas dug. If the space is unimproved, all must be spaded and the path later planted to grass.

Turn the soil over with a spade or spading fork to the full depth of the blade, placing the turf or weeds which are removed from the surface in the bottom of the trenches where they can decay and make humus. Now spread three inches of pulverized peatmoss over the spaded surface and over this sprinkle "Driconure" to a depth of one inch; or a complete fertilizer like 5-10-5 at the rate of three to five pounds per one hundred square feet, the higher rate being for very poor soil. Turn the soil over again with a spading fork, breaking up all lumps and thoroughly mixing soil, peatmoss and fertilizer throughout. Rake the top two inches smooth, leaving a pulverized surface and removing all small stones, clods and roots. You are now ready to plant.

WHAT TO GROW AND WHEN TO PLANT

There are a few crops which every home gardener wants to grow—lettuce and tomatoes, for instance—but others must be decided by the individual family's taste. When you have decided what to grow, mark it on the plot plan.

Plant These as Soon as the Ground Can be Worked in Spring:—

Lettuce is a crop which thrives in cool weather but goes quickly to seed in the heat of midsummer. Make a second planting for fall in mid-July or early August. Place in rows eighteen inches apart and thin the plants to stand six inches apart. Later pick every other one and leave the balance to head up.

Onion sets are set two inches apart in rows eighteen inches apart. When they begin to grow, pull every other one to use as scallions and let the others develop and mature for midsummer harvest. Insist on *white* sets for delicate flavor. After the crop is taken out in midsummer when the tops wither and drop over, a late planting of snap beans can go in their place.

Spinach is an early crop. Plant in rows eighteen inches apart and thin to four plants to the foot. It will be out of the ground before June first when the space can be used for late, tender vegetable plants (see below).

Cabbage and broccoli plants can be purchased and set out early in April. Get a dozen plants of 'Early Wakefield' cabbage if you want the best. Broccoli plants set at the same time will be producing by late May or early June. Set plants two feet apart in rows two feet apart. If you keep the broccoli heads cut, the plants will continue to produce side heads throughout the season.

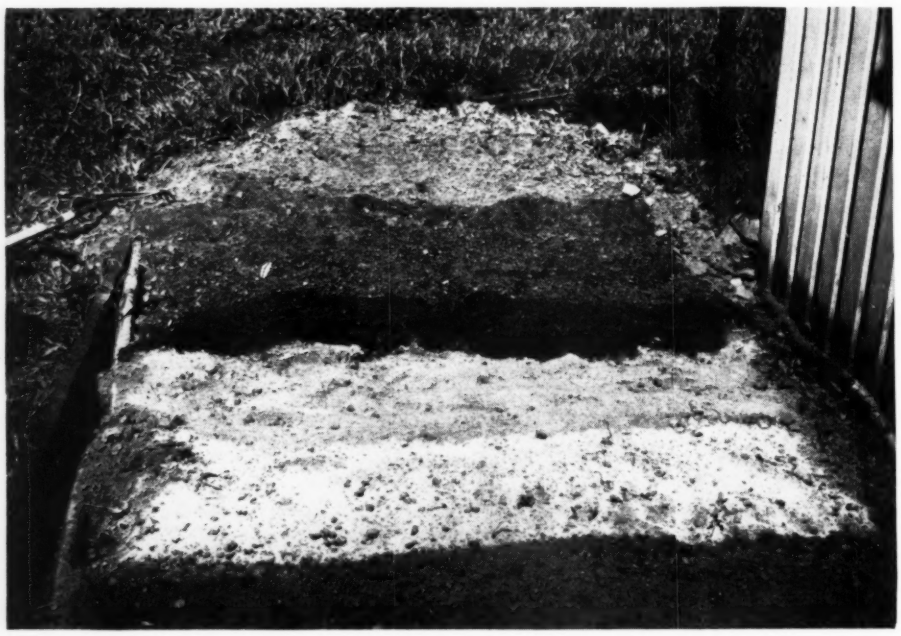
Carrots should be thinned as soon as they are well up. Thin again when finger-size and eat the thinnings. The rest, left to mature, should not quite touch each other when fully grown. Eat carrots while young. They are mature in two and a half months. You can then replant the ground with a late crop for autumn use, or with some other late vegetable.

If you like beets, try the variety 'Winter Keeper' which remains tender all summer and keeps all winter. When it comes time to thin the rows which should be eighteen inches apart, eat the thinnings which are delicious. Later pull every other one for "baby" beets and let the rest mature. They should stand four inches apart.

Swiss chard is rather a coarse green but the red 'Rhubarb' variety is superior, and it has the advantage of being a "cut-and-come-again" crop. Thin the plants to six inches apart in rows eighteen inches apart.

These are Tender and are Planted Late:—

A vegetable of the same sort as Swiss chard but much more delicious when properly prepared is Chinese cabbage. This should be planted in early July, as it will go to seed if it goes in too early. Thin to nine inches apart in rows eighteen inches apart. When the plants form firm heads in fall, use in salad or slice thin, wash, toss for five minutes with butter in a heavy pan, add one cup meat stock and cook about ten minutes or until tender.



Preparing the soil is an important operation —if you want your vegetable garden to yield good crops

Corn, which is universally popular, takes a lot of space so we suggest one of the midget varieties for the very small garden. Even these grow to about three feet so place them where they will not shade lower growing things—on the west or north side of the plot. 'Golden Midget Hybrid' is one of the best of the midgets, producing small thin ears with only six or eight rows of kernels but these are full size, sweet and tender. Plant about mid-May, five or six kernels to the foot, one and a half inches deep and thin to six inches apart.

Eggplant is extremely tender. It can take the place of spinach, the plants being set in early June. Six plants are enough, planted two feet apart in rows two feet apart.

Peppers are in the above category. Choose six plants of a variety you prefer, mild or hot according to your taste. These go in at the same distance as eggplant.

Tomatoes are set at a similar distance. A dozen plants are sufficient for a small plot. Like the corn they should be placed at the west or north side so that they will not shade low plants. Before setting, drive in sturdy stakes at least a foot underground and three to four feet above. Keep the plants tied up as they grow and remove surplus growth, leaving only two main stems. Pinch out surplus new growths at the leaf axils to keep plants in control.

The first snap bean seeds can be planted about the first of May, two to four inches apart in rows eighteen inches apart. To keep up a constant supply, other plantings should follow three to four weeks apart. For this, use the space left by crops which are harvested early. We like the varieties 'Tendergreen' and 'Tenderbest,' which are of the bush type. A wonderful new bean, 'Burpee's Golden Pole,' requires a fence or other support but produces so heavily that it is worth while even for the small garden. The long, tender yellow pods are an inch broad and have a fine flavor. Ideal for "frenching."

Squash and cucumbers, like corn and pole beans, require space, but if you are fond of them, plant along the back edge of the plot and let them wander

outside or erect a fence or trellis which the cucumbers may climb. Zucchini squash is our favorite, especially if picked when six inches to a foot long but still slender. Try it cooked with an onion and a couple of tomatoes. After reducing liquid, break an egg over the mixture just before serving. Let cook three minutes to set the egg and serve.

For a very small garden we do not recommend peas, especially near New York where the summer nights are usually too hot for them. If you must try them, get a dwarf variety like 'Little Marvel' and plant them as near the middle of March as possible. After the vines are removed, in late June, use the space for Chinese cabbage or

Lima beans, which we feel are not too satisfactory, either, for the very small garden, though for a different reason. Pole limas take up entirely too much space and need support; bush limas are less satisfactory and hard to pick. Plant in late May, three to four inches apart in rows two feet apart—thin to six inches apart.

Thinning, General Care, Watering

Many beginners lose much potential good food because they hate to thin their seedling vegetables. Unless you thin promptly and adequately, you will have poor crops or none at all.

As soon as seedlings are well up, thin them to the required distance—or, in the case of beets and others which are edible when young—thin twice, using the thinnings as greens or tender baby vegetables. Lettuce plants must ultimately stand at least eight inches apart if they are to head up. Corn will produce no ears if overcrowded. Root vegetables must have room to swell and grow.

Weeds must be kept down and the only way to do that is to get them out by the roots. As the vegetables grow, a summer mulch of grass cuttings, straw or other available material may be used, thus conquering the weed problem.

Vegetables, like tomatoes, peppers, and eggplants, cabbage and broccoli, which are purchased as young plants by the average owner of a small garden, are greatly benefitted by a feeding of liquid plant food when they are set out and a "side dressing" of nitrate of soda when they have been in the ground three to four weeks. Place the nitrate in a thin ring on the surface, six inches from the main stem, cultivate in lightly, and water.

In long dry spells, water the vegetable garden, not by sprinkling but by feeding the water slowly and deeply into the soil. Take off the hose nozzle, turn the water on slightly and let it seep into the ground; or better still, use one of the plastic hoses with small perforations which deliver a fine mist of water to the beds. Be sure the soil is moist four to six inches deep when you water and you will then not have to do it again for ten days or more.

For the Flower Borders

Decorative borders for this small vegetable garden may be of dwarf double French marigolds like 'Naughty Marietta,' 'Lemon Drop' or 'Melody;' sweet alyssum 'Royal Carpet,' (purple) or 'Summer Snow,' (white); ageratum 'Midget Blue;' dwarf, plumed celosia 'Golden Feather;' dwarf large-flowered petunias such as 'Prima Donna' and 'Ballerina' and dwarf zinnias and nasturtiums.

Another possibility is to border the plot with dwarf curled parsley, chives, creeping thyme, sweet marjoram, and other of the less rampant herbs; or with an everbearing strawberry, the foliage of which is decorative most of the season.

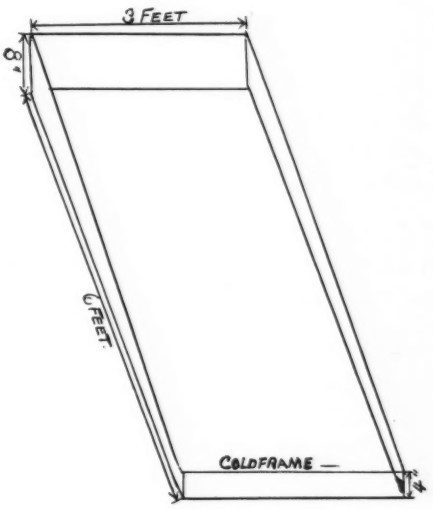
MUD TO MARIGOLDS (from page 2)

that your garden will be the more colorful next season.

And here enters the coldframe into your garden plan—you can do it with pennies.

The procedure for making a coldframe out of a heavy packing case really is very simple: one back board eight inches wide by three feet long by one inch thick, one front board four inches wide by three feet long by one inch thick, two side boards six feet long and tapered from eight inches on the back end to four inches on the front end. Nailed together, these boards form a box three feet wide and six feet long with a slant of four inches from the back to the front. For lasting quality, the box should be painted with "Cuprinol." Creosote is not recommended, because it is toxic to plants.

If a packing case is not available, scrap lumber may be obtained from the local lumber yard at small cost. A glass sash for cover can be made, but making it is somewhat tricky; it may be wiser to purchase the glass sash. An inexpensive substitute can easily be made with "Sun Ray" material, which is listed by the large mail order houses. This material can be tacked over a three-foot by six-foot frame with two or three tree ribs nailed in length-wise to hold the material from sagging. Or you may prefer to get the "Super Pro-Tex More Storm" window—a sheet of vinyl plastic complete with framing strips and nails, and reasonably priced.



The next item to be made for your future garden work is a soil screen for seeds. Two pieces of wood three inches by eighteen inches by three quarters of an inch thick and two pieces of wood three inches by twelve inches by three quarters of an inch thick are nailed together to make a shallow box. A piece of mosquito netting twelve by eighteen, tacked across the bottom, completes a serviceable soil screen.

This soil screen and the coldframe will enable you to raise all the summer annuals you want for a colorful garden.

So, "Hi-ho-hi-ho and off to work we go." In the March - April issue of The Garden Journal, we shall continue the work, preparing for spring, to change your 75'x100' undeveloped lot into a livable, enjoyable garden.

Of Truffles

By Donald P. Rogers

Extracted from the article "Of Truffles" by Donald P. Rogers and Mario A. Pei in "Culinary Review" 32(11): 9, 17; 32(12): 7-9; 33(1): 11, 1954, by permission of Paul A. Urbani and "Culinary Review."

Truffles of one kind or another have been gathered with great effort and eaten with great pleasure in western Europe from Great Britain south, all around the Mediterranean, and through the Middle East. Among the ancients they were appreciated by Pythagoras and Theophrastus, by Pliny and Marcus Aurelius. Large quantities were brought to Rome from Libya and Spain, a historical fact that illustrates the limitations of the scientific knowledge of that age; for the greatly superior black truffles, now known to be abundant in Italy, seem not to have been much used. Nevertheless, the poet Juvenal sang that Libya might keep its wheat if only it would send its truffles. But Classical cooking disappeared with the rest of Classical civilization, and, after providing a thousand years of good eating, truffles disappeared, at least from literature, for close to another thousand, and were reintroduced from Spain only in the 14th century, since when they have rarely been neglected. In 1729 Pietro Andrea Micheli of Florence, generally regarded as the first scientific student of the fungi, gave the name *Tuber* to the most important genus of truffles. In 1788 Vittorio Picco of Turin described the *tartufo bianco* and gave it the name it has since carried, *Tuber magnatum*. In 1830 Carlo Vittadini of Milan published the first general descriptive work on truffles and named, from gatherings in northern Italy, the black truffles of commerce and cookery, *Tuber melanospermum* and *Tuber brumale*. In 1851 the Tulasne brothers of Paris produced the magnificent and classic work that has been the foundation for all later scientific work on truffles.

For most of this time, however, their nature was wholly unknown. Some of the ancients considered truffles to be a product of the earth, essentially mineral, an aggregation of a sort of essence of the soil brought together under the influence of lightning and rain. A third-century philosopher could not otherwise account for them than as "children of the gods," ostensibly because having, as he thought, no seeds, they could not have arisen by any mundane process; the phrase suggests that he found them heavenly in other senses. Even well through the 19th century they remained an enigma. They were found in the earth: therefore they were mineral concretions, or excrescences on roots, or galls produced on the roots by the sting of an insect. They oftenest appeared beneath branches of trees and bushes; therefore a secretion of the leaves, falling upon the earth, must have reacted with it to engender the truffle. Even the most fantastic guess made a contribution to knowledge, for all arose from sound, if still incomplete observation.

Like other greatly esteemed phenomena of our perplexing planet, truffles are not easily defined nor characterized nor understood. Most simply, they may be described as underground mushrooms. And since a mushroom is the fruiting structure of a fungus—that is, a simple organism related to the molds and mildews—a truffle is a fungus fruit that matures underground. Not all underground mushrooms, however, are truffles; there are, for example, subterranean puffballs, which are biologically quite unrelated, and are called false truffles. The true truffles are all kin to that most highly prized quarry of the mushroom hunter, the morel, or sponge mushroom, and resemble it in important points of structure and of development.

The real story of the growth of truffles is as bizarre as the early hypotheses. The truffle as commonly observed and—too uncommonly—eaten is only the fruit of a widely spreading system of colorless, microscopic, branching threads that penetrate the soil for dis-

Black truffles, the one on the left cut open. The surface is marked by black pyramidal warts; the interior is marbled by dark spore-producing areas and light supporting veins.

tances measurable in yards, coming in the closest contact with its particles, absorbing water, dissolved minerals, and gases, secreting enzymes by which the organic soil components are digested, and then absorbing them too. These threads, known as hyphae, touch also the ultimate tips of the roots of trees or shrubs; and there they branch and rebranch, growing all about the living root, enveloping it in a compact felt of fungus tissue, and pushing in between its cells. By the interaction of root and hyphae there is formed a compound structure part plant and part fungus, and a partnership necessary to each. For the fungus cannot further develop without nutrient substances, of the nature of vitamins, which are built up by the green plant; and the plant cannot long grow in nature (though it may flourish in a garden) without the highly efficient system for the absorption of water and minerals that is constituted by the fungus. Whether the two organisms are seen as mutually beneficial or mutually parasitic, they are known to be mutually dependent.

When the hyphae have absorbed from soil and plant enough raw materials, and have built up within themselves enough food, they proceed to fruiting, just as does an apple tree or a grape vine. The fruit, which develops out of a knot of hyphae, is the truffle.

An apple is food for man, but the only hope of progeny for the tree; so, for the fungus, is the truffle. Within it are numbers of microscopic spores each of which, if carried to the proper place, may grow into a new fungus. Just as the flesh of the apple is bait for some animal who will carry its seeds to a new place, so is the delicious flesh and irresistible odor of the truffle. Before man gathered truffles, there were foxes, pigs, squirrels, and deer that did so, and flies and beetles that nibbled at the flesh. All of these carried the spores abroad. Two animals, the dog and the pig, are trained by man to assist in gathering truffles, the dog chiefly in Italy, the pig in France. The animal's nose enables him to find buried treasure where it is hidden from his master; the master finishes the digging, so that no truffle shall be lost, rewards the animal with some less noble food, and puts the truffle in his basket. Man unassisted may find truffles, and in many parts of the world they are gathered in no other way —

TRUFFLE RECIPES

By MARGARET ELIZABETH URBANI

SPAGHETTI WITH TRUFFLES

1 Pound Spaghetti
2 Cloves Garlic
1 Dash Pepper
⅓ Cup Olive Oil
1 Teaspoon Salt
½ Cup Cooked Tomato Sauce
½ Pound Tin Black Truffles

Put water and salt to boil and when boiling add spaghetti and cook for 15 minutes or until spaghetti is done to your taste. Drain. While spaghetti is cooking, place oil in frying pan. Add garlic to brown. Remove garlic from frying pan when brown, add grated truffles, juice, and tomato sauce to frying pan. Cook 3 minutes gently. Place spaghetti on serving plate. Pour truffle sauce over spaghetti. Mix lightly and serve. Serves 4

TRUFFLE OMELETTE URBANI

3 Tablespoons Olive Oil
4 Eggs Beaten Lightly
1 Clove Garlic
2 oz. Tin Black Truffles (Grated)
⅛ Teaspoon Salt
⅛ Teaspoon Pepper
1 Teaspoon Marsala Wine
Truffle Juice (from tin)

Beat eggs lightly. Add salt and pepper, grated truffles and juice, and Marsala wine. Heat olive oil in frying pan. Brown clove of garlic. Pour in egg mixture. Cook over low flame 5 minutes on each side.

RISOTTO PIEMONTAISE (WITH TRUFFLES)

1½ Cups Rice
1 Small Onion, Minced
¼ Cup Butter
1 Small Box Saffron Dissolved in 2 Tablespoons Broth
4 Tablespoons Butter
2 Quarts Chicken Broth
4 Tablespoons Grated Parmesan Cheese
4 oz. Tin White Truffles (sliced)

Melt the 4 tablespoons of butter in a saucepan, add the onion and brown. When brown, add the rice and stir well until all the butter is absorbed. Add the chicken broth a little at a time. Do not let rice become too dry. Cook 40 to 45 minutes over a low flame. Stir constantly. When done, add ¼ cup of butter and saffron and mix well. Add thin slices of white truffles over rice. Then sprinkle with Parmesan cheese and serve.

CHICKEN CACCIATORA WITH TRUFFLES A LA URBANI

½ Cup Olive Oil
1 Teaspoon Salt
1 Dash Pepper
¼ Cup Chopped Onion
1 Clove Chopped Garlic
1 Chopped Green Olive
½ Cup Celery
1 Tablespoon Red Wine Vinegar
1 Chopped Filet Anchovy
1 Teaspoon Rosemary
¼ Cup Sherry Wine
2 Basil Leaves
2 Black Truffles (sliced) (White Truffles can be used)
1 3-4 lb. Chicken

Place the chicken in frying pan with olive oil. Add chopped onion, garlic, parsley, celery, basil, salt and pepper. Brown thoroughly on all sides for about 10 minutes. Remove the above ingredients in a mixing bowl, add chopped olive and anchovy, sherry wine, red wine vinegar, rosemary and the sliced truffles. Pour over chicken and cook in open pan for 35 to 40 minutes or to taste; or simmer (in covered pan) for 30 minutes or to taste. Serve. Serves 4

TRUFFLE RECIPES

CROSTINI URBANI
(canapés)

Remove the crust from several thin slices of bread (white or dark). Then cut in fancy or square shapes. Fry them in butter or toast and spread with butter. Chop or mash one 2 ounce tin of black truffles and spread on the bread while hot. Squeeze a few drops of lemon juice. Add small pieces of filet of anchovy. Small pieces of red canned pimiento may be added for eye appeal or decoration.

VEAL URBANI

12 Small Slices Veal Cutlet (cut very thin)
12 Small Slices Prosciutto (cut very thin)
¾ Pound Mozzarella Cheese (cut very thin)
¼ Cup Butter
¼ Cup Olive Oil
½ Cup Dry Wine
⅛ Teaspoon Salt
⅛ Teaspoon Pepper
1 White Truffle (sliced)

Flatten out veal cutlets with mallet or ask butcher to do it. Place one slice of Prosciutto and thin slice of Mozzarella cheese and thin slice of white truffle on each veal cutlet and fold together like an envelope, using toothpicks to hold them together. Place oil and butter in frying pan. Brown veal envelopes well on one side, then turn gently and brown on the other side. They should cook in a short time. Remove meat from the pan, pour wine and remaining sliced truffle into it, scraping bottom and sides of pan well. Add 1 teaspoon butter, salt and pepper and pour sauce over veal envelopes on serving dish. Serves 4

URBANI FONDUTA
(melted cheese)

1 Pound of Process Cheese (diced)
Milk (enough to cover cheese)
1 Tablespoon of Butter
6 Egg Yolks
¼ Teaspoon of White Pepper
1 White Truffle (chopped or sliced)
1 Tablespoon Butter (2nd portion)

Place cheese, butter and egg yolks in upper part of double boiler; add milk and place over boiling water. Beat with rotary beater. At first, cheese will melt and then will become a little harder. When it becomes harder remove from over boiling water. Add pepper, truffles and butter, and mix well. Serve on toast. Can also be used with rice or polenta.

URBANI TRUFFLE SAUCE

Chop together a small piece of onion, half a clove of garlic and some parsley. Set it on the fire with less than 1 ounce of butter, and as it takes on color, pour in ¼ glass of Marsala wine, or plain white wine, in which a spoonful of flour has been previously mixed. Salt it; add some pepper and some agreeable spice. Stir often with a spoon. As the flour has blended with the rest of the ingredients, add a little soup and then enough thinly-sliced truffles. Let the sauce remain on the fire for a few moments and serve it as a dressing for milk-fed veal cutlets, or any boiled or roast meat.

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where cracks in the soil show that something is growing beneath it, or where a spot of ground looks like others where truffles have been found. But the result is many empty holes.

The association of truffles with trees and shrubs was well known long before the reason for it. Since men found it impossible to cultivate truffles, the experiment was made of cultivating trees. The truffles of commerce were observed to occur, more abundantly under three or four species of oaks than anywhere else; and during the last century it was discovered that when acorns were planted in suitable soil in areas where truffles were gathered, they brought with them, in eight or ten years, a crop of truffles. It has never been shown that seeding the soil with chopped-up truffles does anything to hasten the crop; apparently spores are present in the soil pretty much throughout the truffle areas. Many other trees encourage the growth of truffles—poplar, hazel, pine, beech; and the African truffles are usually found under various bushes. Much waste land has been reforested in efforts to establish truffleries; but much of the crop still comes from native forest.

In size truffles range all the way from that of a small pea to that of a small melon; perhaps hazlenut and hen's egg would define the commoner variation; in color from white through buffy, shell-pink, chestnut-brown, and chocolate to shiny jet black; in texture, from the fleshiness of a cultivated mushroom to the firmness of a Brazil-nut. The shape usually is round, but irregularly so, like a nut or a new potato. Many kinds look a good deal like varicolored pebbles, and since they often occur in gravelly soil, more than one truffle hunter has had to discard part of his finds. Some have little taste, some taste like mushrooms, one highly prized kind has a touch of garlic in its flavor, and the most sought after, those best known to cooks and in commerce, seem to combine in one rich particle the savor of a filbert and of a properly matured cheese. The odor of these last is indescribable—at least in prose. One sober botanical author mentions strawberries; but that is inadequate and incomplete.

Many kinds of truffles are known. A recent European treatment of these fungi lists over thirty species from that continent, and the latest American work, over sixty from this country and Canada. Many of these are so rare that all known specimens are preserved in museums; others are small, or have a not especially distinguished flavor; others are eaten by those who find them, but never appear in commerce and rarely in great cookery. Three species — two closely related black truffles and a white one—have been celebrated in the ecstatic writings of gourmets and lovingly used by students of the art of cooking. The white truffle is a feature of Italian cooking, and its value has escaped the rest of the world; black truffles are the darlings of the French chef, and known

(Continued on page 20)

NEW DAYLILIES IN 1956

By **A. B. Stout**

THE DAYLILIES here named and described for the first time are seedlings that were obtained at The New York Botanical Garden prior to 1947 and since then grown for evaluation and propagation by the Farr Nursery Company in Pennsylvania. All of these clones have foliage that is dormant or semi-dormant, and all have proved fully hardy. They differ decidedly from each other, and none is closely similar in respect to certain features of interest to gardeners to any clone of previous introduction by the writer.

Four of these clones have small full-petaled flowers (figures 1, 2, and 3) mostly two to two and a half inches in spread. These clones differ in stature, in periods of bloom, and especially in the flower coloring. The 'Goldfinch' daylily has flowers that are uniformly golden-yellow, the period of flowering has been in late June and early July, and the scapes have been as tall as thirty-six inches. The 'Liebling' daylily (figures 3 and 4) has flowers of yellow tinted with tan, and there is a conspicuous mid-zone of brownish red that may be called burnt sienna. The flowers of the 'Liebchen' daylily (figures 1 and 5) have a throat of golden-yellow, the blades of the petals are brownish red and only slightly darker in the mid-zone, and the sepals are less red than the petals. In 1954 the first flower on a plant of 'Liebchen' opened on June 16, but in 1955 the first flower on the same plant was open on May 12. The 'Candelabrum' daylily has scapes about thirty inches tall, and the flower pedicels are somewhat stiffly spreading. The throat of the flowers is golden-yellow, and there is a conspicuous mid-zone that is almost maroon in shade. Its margin is blended with the lighter but rich color of the outer portion of the petals. The period of bloom in the writer's garden has been in early June.

The clones 'Jennie Love' and 'Charmaine Queen' are selections of numerous seedlings of several generations derived from wild plants of *Hemerocallis fulva* var. *rosea* of which the 'Rosalind' clone is the type plant. A seedling of one of the early generations was named 'Charmaine' in 1934. The 'Jennie Love' daylily is dedicated to the memory of the writer's sister-in-law. The flowers have spreading and somewhat twisted petals and recurving and twisted sepals as shown in figure 6 and the spread is about five inches. The mid-zone of the petals is bright red bisected by extensions of the golden throat. The general aspect of the flowers is a bright reddish pink, due to the scarlet-red veins that extend into the otherwise pink blades. The scapes are well branched and erect to a height of thirty-six to forty inches. The 'Charmaine Queen' daylily has long petals and sepals that give a spread of as much as six inches. The ground color of the petals is coral-pink with a bright red mid-zone and veins. The sepals are more uniformly coral-pink, for the veins are not as conspicuous as is the general rule. The scapes have been as much as forty-five inches in height. The flowering period of these two clones has been in July.

The 'Penelope Stout' daylily is dedicated to the memory of the first of the writer's six generations of grandmothers in America. (A biographical account of Penelope Stout and of her contributions to the pioneer life of New Amsterdam and early New Jersey in the period prior to 1669 has been published in the volume entitled *Stories of New Jersey* by Frank P. Stockton.) The flowers of this daylily have a blend of colors in a pattern that is not duplicated in any other daylily that has been named by the writer. From the base of a petal to its tip there is a sequence of five different colors. The throat is green at the base, changing to golden-yellow. The mid-zone is bright coral-red that is bisected by a stripe of pale yellow that extends along the mid-vein of each petal. Next to the mid-zone there is an area of paler coral-red and the margin of each petal is buff. The sepals are chiefly coral-red with a contrasted border of buff. The scapes have attained a height of three feet, and they are well-branched. The period of bloom has been in July.

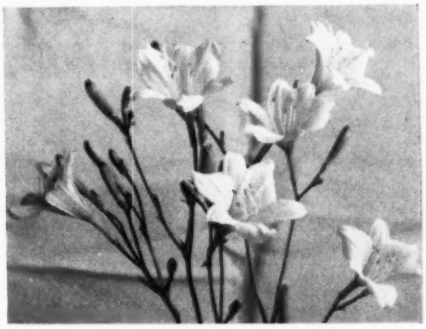
As indicated in figure 7, the 'Statu-

-1-

'Liebchen' is one of the seedling daylilies obtained at The New York Botanical Garden and propagated by Farr Nursery Co.

-2-

The golden-yellow of daylily 'Goldfinch' appear in late June and early July



-3-

Daylily 'Liebling' has yellow flowers tinted with tan, and a mid-zone of brownish red

-4-

Top—Plant of daylily 'Liebling' with scapes thirty-six inches tall

-5-

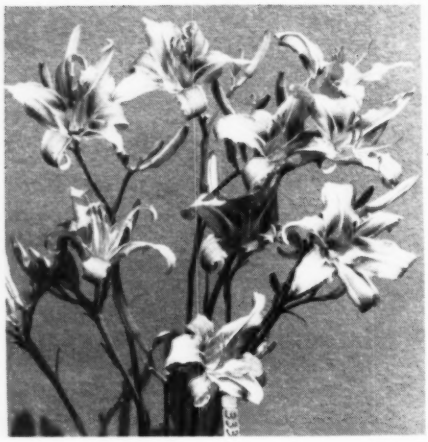
Center—Plant of daylily 'Liebschen'

-6-

Right—Daylily 'Jennie Love' was selected from seedlings of several generations derived from wild plants of *Hemerocallis fulva* var. *rosea*

-7-

Daylily 'Statuesque' combines an abundance of flowers on well-branched scapes and upstanding foliage



esque' daylily has a distinctive stature. It combines upstanding foliage with tall much-branched scapes that provide an abundance of flowers. The foliage is bending at the tips at a level of about three feet, above which the flowering portions of the scapes arise for at least two feet. The flowers are somewhat fragrant, full, and trumpet-shaped with the margin of the petals somewhat crinkled. They hold their form and their uniformly empire-yellow color in the hottest weather throughout daylight and until after dark. The flowers are nearly three inches in spread and the climax of blooming is in mid-July. The 'Statuesque' daylily is a complex hybrid derived by crossing a member of the tall night-blooming *Hemerocallis*

-8-

Top left. Daylily 'August Glow' was derived from a cross between a late flowering plant of *H. multiflora* and red selections strongly *H. fulva* in descent

-9-

Top right. The rosy red flowers of daylily "Chancellor" have continued until mid-September

-10-

Lower right. Daylily 'Autumn King' produces yellow flowers on many-branched scapes through most of September

altissima with lower-growing daylilies that were diurnal in their flowering.

The three remaining clones of the present list flowered as young seedlings at The New York Botanical Garden, and hence their selection has been made by H. G. Seyler of the Farr Nursery Company. They have been judged to have special merit as late-blooming clones.

'August Glow' has thus far flowered in late August and until as late as September 10. The flowers are rather small with a spread of about two and a half inches. Their general color is a coppery buff with a somewhat darker mid-zone and a paler stripe along the mid-vein of each petal (figure 8). This clone is a complex hybrid derived by crossing a late-flowering plant of *H. multiflora* with red-flowered selections that were strongly *H. fulva* in descent.

The 'Chancellor' daylily has flowered until mid-September. The scapes are about five feet tall and much branched. The flowers (figure 9) are wide-spreading to as much as five inches. The conspicuous throat of the flower is golden, outside of which the prevailing color is a dark shade of red that is strongest in the mid-zone, and there is a mid-strip in each petal. Mr. Seyler's notes state that the color is a "rosy red that is slightly lighter than the color in 'Rose Gem'."

At the Farr Nursery, plants of 'Autumn King' have been in flower during most of September. The scapes are stiffly erect to a height of five feet and are profusely branched. The flowers (figure 10) are full, about four inches in spread, and their color is a uniform shade of yellow. This clone has been rated as the best thus far obtained for this color in a late-flowering plant. It is one of numerous seedlings obtained by crossing 'Autumn Prince,' which was introduced in 1941, with late-flowering seedlings that had larger flowers in yellow colors.

CIRCULATING LIBRARY OF THE NEW YORK BOTANICAL GARDEN

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Perhaps some of our members may have books in which they are no longer especially interested, in their personal libraries, and they may be willing to donate these books to the Circulating Library of The New York Botanical Garden, announced on page 31 of this issue. Such gifts will be gratefully received, as they will enable the Garden to make this special service more comprehensive. The books should be of interest to home gardeners — including botanical and gardening subjects and such allied subjects as flower arrangement, birds, nature study.

Brachycome iberidifolia is a tree-flowering annual for the front of the border

WEALTH OF ANNUALS

FOR THE SMALL GARDEN

By Dorothy Ebel Hansell

Salpiglossis are decorative in the flower border or flower arrangement

SOME ONE ONCE SAID that annuals are to a small garden what frosting is to a cake. One can bake a very fine cake, but without frosting even the finest cake, you will agree, does not have "eye appeal." So it is with the small garden. It can be charming with trees and shrubs and verdant lawn, but come midsummer—without annuals it, too, lacks "eye appeal."

We rely on annuals to give life and zest to the garden in summer. No other group of flowering plants is so valuable in creating enchanting effects at that time of the year. Annuals bloom freely and contribute a great diversity of form, texture, color, and some even fragrance. They may be planted in beds or borders by themselves, or in the "mixed" (bulbs, perennials, annuals) border; they are useful to fill space occupied by the spring bulbs; and they can be grown in the vegetable or cutting garden.

With seed catalogs listing so many annuals—and each year new hybrids and color forms are offered — small wonder that the home gardener becomes bewildered and doesn't know how to make his selection. Undoubtedly, he will choose marigolds and zinnias, among the must durable of all annuals. Both have been spectacularly improved in recent years, are available all the way from miniatures to giants, are very much in the public eye, are easily grown, and dependable for a long period of bloom. Petunias, too, have been exploited and deservedly so, for they are lovely in the garden and in bouquets. But there are other annuals with which the gardener and especially the new home gardener should become familiar.

Brilliant colors are usually thought of when considering annuals, but soft colors, including shades and tints of blue, also prevail. So it is altogether feasible to have a bed or border of annuals in pastels, as it is to have a bed or border in glowing yellows and reds. One can have an all-white border of annuals — one of sweet alyssum, petunias, African daisy, asters, scabiosas, stocks, snapdragons, zinnias. It will pay to consider annuals thoroughly — the many different kinds, their many forms, their wide range of colors—before you finally decide on your seed order this spring.

We are not attempting to suggest all the annuals — not even all the "best" annuals for the small garden. We are presenting some of the annuals we have grown from time to time, and these include everybody's favorites, the most popular, and some which ought to be more popular than they are.

Beautiful as their flowers are in form, texture, and color, and prized as they have always been for cutting, asters lost face for quite a while with home gardeners. They caused him so much trouble with wilt disease and stem rot that he became discouraged and declined to grow them. However, after the wilt-resistant and early-blooming strains were developed, asters began to regain their place in the summer garden. By selecting extra early and midseason varieties and sowing seeds of the extra early indoors, the home gardener can enjoy asters from midsummer until frost. They grow about two feet tall and bear white, pink, rose, blue, lavender, and red flowers—'Heart of France' is the reddest of all. 'Powder Puffs' with uniform stems about a foot long bearing fully double flowers, are ideal asters for cutting.

Antirrhinums—or snapdragons—are biennials but are generally treated as annuals. You can raise your own seedlings, starting seeds of rust-resistant varieties indoors, or you can buy seedling plants in flats.

For the home gardener who does not have the facilities to sow seeds indoors and make transplants, the garden centers which have been appearing in recent years near residential areas are a boon. The majority are operated by reputable nurserymen and seedsmen, and quality plant material is available. Naturally, when you buy seedling plants, the cost of planting annuals in beds or borders is more than when you raise your own plants from seeds. But buying the plants does have a distinct advantage—you can more readily plant for effect in groups or drifts. It is not so easy to do this, if you must sow the seeds where the plants are to grow to maturity. In that case, you must sow the seeds in a group or drift—not in a straight line—and thin out as the little plants develop. Sow in straight lines only in a cutting garden, or if growing annuals in one section of the vegetable garden. Annuals growing in straight lines across a bed or border do not make a pretty picture.

And now back to antirrhinums, which come in packets of mixed colors or named hybrids in white, pale pink to rose, yellow, copper, red. About fifteen years ago F_1 hybrids were developed as

winter-flowering greenhouse snapdragons — with larger florets on longer spikes, greater resistance to disease, and a quicker and stronger growth. F_1 hybrids for garden use have recently been introduced in several mixtures—among them Hit Parade and Tetraploid Supreme. Gardeners who have tried them are well pleased with the performance of these new snapdragons. They grow twenty-four to thirty inches high—to thirty-six if well grown — and their flower spikes are splendid for cutting. Staking them is advisable.

Brilliant calendulas or pot marigolds are "must haves." Attractive in beds and borders, they bloom freely and are useful as long-lasting cut flowers. If the summer is not insufferably hot, calendulas in creamy white, delicate apricot, clear lemon-yellow, and rich orange will bloom from early summer till Jack Frost strikes.

Easily raised from seed is the cornflower, or you may know *Centaurea cyanus* as bachelor's button, ragged robin, ragged sailor. By whatever name called, this annual is liberal with its flowers from early summer until fall—provided you are careful about removing faded flowers. 'Jubilee Gem' with dark blue flowers is very popular, but other named forms—in white, pink, lilac and dark red—may be had.

Cosmos are decorative in the garden and good for cutting if—and this is important—you immediately place the stems of the cut flowers in water. Otherwise, they will droop quickly and add little to your flower arrangement. The tall varieties, four to five feet, need to be staked and, of course, they are background plants. Formerly cosmos flowers were white, pink and maroon, but hybridizers have added yellow and orange to the color range — 'Yellow Flare,' 'Orange Flare', and 'Fiesta,' for example. 'Orange Flare' is an All-America gold medal winner; the other two are All-America silver medal winners. 'Sensation' is a giant early-blooming strain, that flowers within ten weeks of seed sowing.

Dwarf dahlias are decorative and useful. The compact plants, one and a half to two feet tall, bloom profusely all summer long until frost, if you do not allow flowers to form seed pods. And as they are in demand for cutting, it is hardly likely that there will be any faded flowers on the plants. Their foliage has a clean-cut look, an effective foil for the flowers. You can obtain seeds of Coltness Single Hybrids, Unwin's Semi-Double Dwarfs, or Mignon Single Mixed. The seeds, sown indoors in March, germinate quickly and the little plants start blooming within ten weeks. If you prefer, you can buy seedling plants by the dozen or in flats. There is a pleasing color range — pure white, yellow, salmon, apricot, rose, red.

Dainty puffs of cornflower-blue are nestled among the feathery foliage of nigella 'Miss Jekyll'

Dianthus chinensis, or annual pinks, are of the easiest culture, and seeds can be sown where the plants are to grow—thinning out the seedlings as they develop. You may select seeds of single or double forms, fringed or deeply laciniated, self colors from pure white through the pinks to deepest red, or flowers that are blotched or eyed or margined with a contrasting color. About a foot high and blooming generously from late June until frost (if faded flowers are removed) the annual pinks make most attractive edging plants for the annual or mixed border. Tetra Heddensis, a new race resulting from a cross between *D. chinensis* and var. *Heddewigii* is more tolerant of really hot weather than are its parents. "Westwood Beauty," an All-America winner several years ago, stands summer heat well and is an early and constant bloomer. The flowers, deeply fringed, vary from a fiery crimson to a dark velvety red with occasional breaks in lighter tones.

Gaillardias are really reliable, endure hot weather and drought, and keep right on blooming all summer and well into fall. There are single and double-flowered forms in yellow, orange or red, and in combinations of two or more of these colors. Lorenziana Double Mixed is one of the new and desirable strains. They're good for cutting and grow eighteen to twenty-four inches high.

Annual larkspurs are very effective in border plantings, and no less effective in flower arrangements. They are easily raised from seeds which should be sown early, as they like cool weather for germination and growth. Several fine strains are available including the Cathedral Sphire in white, blue, rose, and scarlet with long upright flower stems branching from the base; and the Steeplechase and Giant Imperial strains in white, pink, red, blue and a lovely silvery lilac. These strains tolerate warm weather better than some larkspurs do. The plants vary in height from three to five feet.

We've already mentioned that marigolds run from miniatures to giants. The tiny ones are the single and double-flowered French marigolds. Then there are carnation-flowered, chrysanthemum-flowered, ball-flowered among the tall or African marigolds; and the so-called hedge marigold 'Spanish Gold', which received an Award of Merit from the R.H.S., makes such even growth that a row gives the appearance of a low hedge, eighteen inches high. There are buff, canary-yellow, lemon-yellow, gold, orange-colored flowers—and the aim is now for a white marigold! W. Atlee Burpee Co. in 1954 offered $10,000 for seeds that would produce a white marigold. 'Man-in-the-Moon' with pale moon-yellow, carnation-like flowers is the nearest to white so far. The New York Botanical Garden this past season grew approximately nine thousand marigolds in seventy different named varieties.

Love-in-a-mist, or nigella 'Miss Jekyll,' is a charming annual which belongs to the same family as the larkspur. The dainty puffs of clear cornflower-blue, nestled among feathery foliage, appear for a long time—provided you snip off fading flowers before seed pods form. Seeds may be sown

where the plants are to stand—nigella 'Miss Jekyll' is undemanding, responds to ordinary treatment.

Nicotiana, or sweet-flowering tobacco, scents the garden in the evening with its exotic perfume. The white-flowered affinis hybrids are especially appealing, but 'Crimson Bedder' has its host of admirers. Its velvety crimson flower heads are held erectly on a strong two-foot plant. And if you want other colors, try a packet of the Sensation Hybrids—with flowers coming in white, rose, mauve, red, and even chocolate. 'Daylight' is an exquisite white of this strain. Nicotiana is of easy culture — sow the seed where you want the plants to grow and thin out the seedlings to ten inches apart. Nicotiana is one of the few annuals that will take some shade. The majority of annuals, you know, want full sunshine, also well-drained soil.

Few annuals make such a display in the small garden as do petunias. And the hybridizers have certainly worked to produce many new forms — single or fully double flowers, smooth-edged or ruffled or fringed, small flowers two inches in diameter up to large or "colossal" flowers four and five inches across. As for color! Petunias have a wide color range—pure white, creamy white, pale to deep pink, rose, salmon, dark red, blue, violet, and others. They are classified as balcony, bedding, dwarf, giant. The first group may be planted in baskets and plant boxes as well as beds, for they trail. The bedding group is used for large beds and borders; the dwarf, growing in compact mounds, is ideal for the front of a border or as an edging plant; and the giants fit into beds, borders, window boxes, and also make good cut flowers.

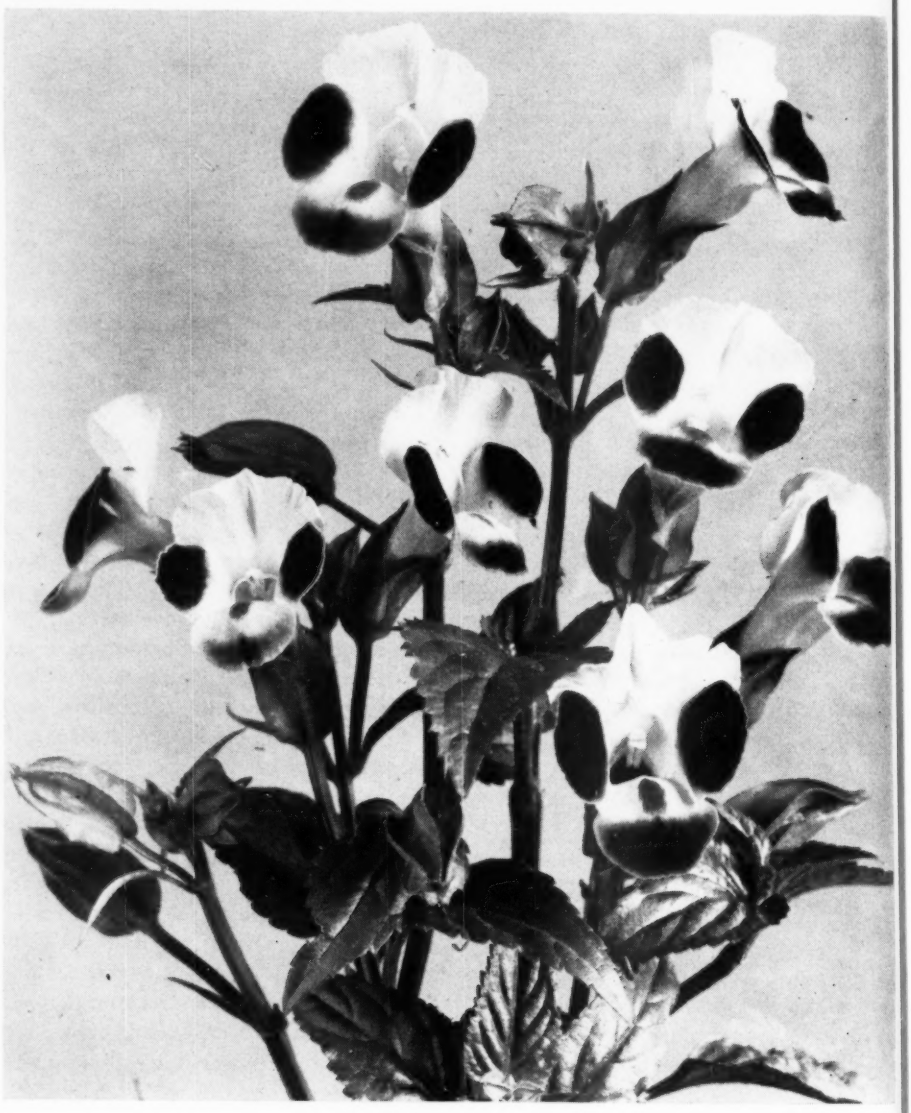
There are many All-American medal winners among petunias. To name a few: 'America,' 'Ballerina,' 'Comanche,' 'Fire Chief,' 'First Lady,' 'Mrs. Dwight D. Eisenhower,' 'Peach Red,' 'Pink Sensation,' 'Rose Marie.' Many others which have not achieved All-America fame, are, nevertheless, quality petunias —for instance, 'Allegro,' 'Nocturne,' 'Rhapsody,' 'Sonata,' 'Burgundy,' 'Martha Washington,' 'Snowball.' 'Sonata' and 'Snowball' are outstanding double whites.

You can sow seeds outdoors, after the soil has warmed up; but to enjoy a long blooming period, you should sow seeds in seed pans or shallow boxes indoors in late March or early April, transplanting the seedlings to flats to make sturdy little plants for garden planting in May—or when there is no danger of frost. Petunia seedlings can be bought in flats at planting time—but you are not likely to have as wide a selection, especially of the newer and more choice varieties, as you do when you buy and sow the seeds.

Several good strains of *Phlox Drummondii,* the annual phlox, have been developed. They are among the most satisfactory of all annuals, for borders, bedding, edging, cutting. Annual phlox bloom more freely and the flowers are of better substance and color when grown in a light rich loam. The plants start to bloom in early summer and continue until frost, provided fading flowers are picked off promptly. Seeds of named color forms are available, as well as packets of mixed colors. Art Shades and the Star Mixed Strain are two of the best. You can create delightful color combinations by planting annual phlox and petunias.

Salvia farinacea, while a perennial, is usually handled as an annual—because it needs winter protection in cold climates. It grows quickly — starts to flower within two months after seeds have been sown. The showy light blue sprays add a certain grace to the border and combine happily with other flowers in arrangements. 'Blue Bedder' with an abundance of wedgewood-blue flowers is a desirable form.

Salpiglossis or painted tongue is another annual that lends distinction to a mixed border or planting of annuals, and ought to be used more often in



Torenia Fourneri flowers profusely over a long period

The bright orange-scarlet flowers of *Tithonia speciosa* are fine for cutting

small home gardens. The trumpet-shaped flowers in white, yellow, pink, red, are exquisitely veined with gold, silver, or purple; and they are produced generously from early July until frost. Salpiglossis are decorative, too, in arrangements.

Stocks, with their spikes of flowers in snowy white, clear yellow, flesh-pink, lavender, intense red, bring fragrance as well as pleasing colors to beds, borders, and flower arrangements. Seeds must be sown indoors in March in a temperature of 55°-60°; the seedlings potted up to be transplanted outdoors when there is no more danger of frost and the soil is beginning to warm up. If you haven't the facilities to start stocks indoors, you can buy little plants from the local grower.

Torenia Fourneri is worthy of wider acquaintance, for it flowers freely over a long period and may be used in arrangements as well as being decorative in the border. The flowers, white or lavender or dark blue, somewhat like the snapdragon, have a touch of gold in the throat.

Tithonia, too, should be seen more frequently. The Mexican sunflower, growing four feet tall, is a nice background plant. Actually, it is a perennial but is handled here as an annual. Its bright orange-scarlet flowers, resembling a single dahlia, are fine for cutting. 'Torch,' an All-America silver medal winner, is really spectacular.

Verbenas are valuable annuals; colorful, long-season bloomers, they thrive in any well-drained soil and bear up well during dry spells. They are not altogether satisfactory as cut flowers. 'Apple Blossom,' 'Floradale Beauty' and 'Blue Sentinel'—the last two are All-America medal winners — 'Salmon King' and 'Royal Bouquet' are among the loveliest. Sow seeds indoors early—or buy seedlings from a dealer.

As with marigolds, zinnias run from dwarf (ten inches) to giant (three feet) plants; from miniature, lilliput, cupid, and Persian carpet to large dahlia-like flowers; from white through pastels to brilliant orange and reds, even royal purple. They are easily grown in any garden soil, but prefer one that has been well fertilized. They endure hot weather, but appreciate water in a dry spell. They like sun, but will grow in light shade. Seeds may be sown outdoors in May where the plants are to stand; but for best results and a longer blooming period, especially with the large-flowered zinnias, seeds should be started indoors in April. The giant zinnias need one and a half to two feet between plants for full development; the dwarf one foot between plants.

Ageratum, *Brachycome iberidifolia* or Swan River daisy, sweet alyssum—all easily grown, free-flowering annuals for edging beds and borders; anchusa 'Blue Bird,' carrying graceful sprays of flowers from early summer until fall; *Arctotis grandis,* with blue-centered, white daisy-like flowers, fine for cutting; calliopsis with daisy-like flowers in yellow, orange, and red and finely-cut foliage, so easily grown and blooming continuously from early summer until frost; *Gilia capitata* and *Trachymene coeruleus,* both bearing blue flowers that combine so well with others in the most exacting arrangement—but enough! We cannot hope to reveal all the wealth of annuals.

We have referred to height for, of course, dwarf plants belong in the foreground; plants of medium height in the middle section; tall plants in the background. You can—and should bring an occasional taller plant forward to break the height of the middle section; and you should plan to have the tallest plant at each end of the back of the border, with plants of varying height creating an undulating effect between the ends and the middle. In other words, what you want to avoid is an appearance of uniform height.

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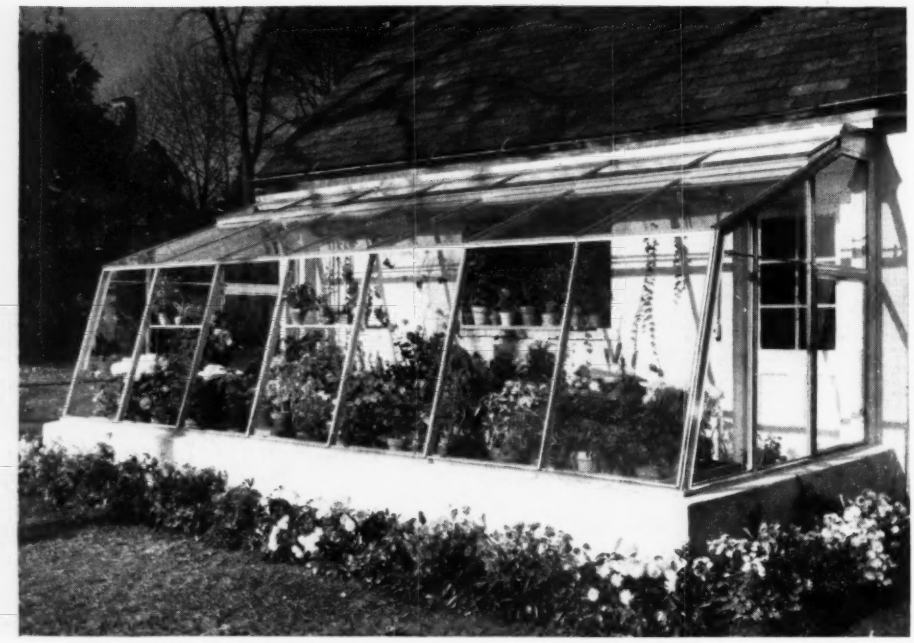

A "lean-to" greenhouse attached to a garage

Gardening in

The day comes when the keen amateur gardener feels he must have some kind of facility that will enable him to pursue his hobby during the winter. And he will be pleasantly surprised when he consults a greenhouse designer-builder, or his garden supplies dealer, to learn of the different structures that fit varying needs and budgets. Prefabricated greenhouses reduce construction costs, while aluminum or redwood framework cuts down maintenance. A greenhouse is no longer a luxury—the "do it yourself" enthusiast can even build one himself from plans, or he can engage a local carpenter or handyman to help him.

Greenhouses fall into two types—the free-standing and attached. The latter may be an even span greenhouse attached to the dwelling at one end, or it may be a "lean-to." A "lean-to" is half a greenhouse, usually longer than wide, with the wall of the building to which it is joined serving as one of its walls. If the "lean-to" is erected in a set-back of the dwelling, two of the dwelling walls are walls of the "lean-to" structure. This, however, reduces the amount of available sunlight.

An attached greenhouse is less expensive to build and also less expensive to operate than a detached, for heat is supplied from the heating system of the residence. (Heat—whether supplied from the main heating system or by a separate unit—and ventilation should be thermostatically controlled for convenience and best results.) Another advantage of the "lean-to"—one does not have to walk through rain or snow or sleet to reach his plants growing under glass. However, the detached greenhouse has more bench space, may have a workshop or "potting shed," and can be located to receive maximum sunlight, thus providing light for the plant material from all sides.

One of the most popular of the small greenhouses is the "Orlyt," available as free-standing or attached and in sections knocked down and ready for assembly. The home greenhouse may be as small as eight to ten feet wide by twelve to fifteen long, or it may be fourteen or more feet wide by eighteen or more feet long.

Ingenious home gardeners have devised "window greenhouses" in which they successfully grow plants. An African violet grower in northern New Jer-

Petunias, snapdragons, cyclamen, daffodils, hyacinths, geraniums and other potted plants fill a "lean-to" with colorful blooms in late winter

nder Glass

A free-standing "Orlyt" greenhouse in an attractive setting

sey has "window greenhouses" on both sides of the breezeway connecting residence and garage. The healthy condition of her African violets, several hundred plants, attests to this satisfactory way of gardening under glass. She also finds the "window greenhouses" useful for starting new plants from leaf cuttings and from seeds.

The new owner of a greenhouse, regardless of its type or size, will need to restrain his enthusiasm and eagerness and not attempt to fill all the space immediately. He will want to reserve a corner for cuttings, for forcing spring bulbs such as tulips, narcissi, hyacinths, freesias, grape-hyacinths. Then he will want to plant for a colorful display from October to May. This he can accomplish by growing chrysanthemums, begonias, cyclamen, geraniums, pelargoniums, primulas, cinerarias, fuchsias, stocks, snapdragons, ranunculus, or gerberas as he chooses.

The amateur gardener is well advised to run his greenhouse as a cool house, that is, at a temperature range of 45° to 55° at night. The plants previously mentioned are cool house subjects. As he gains experience, he may wish to expand his plant collection and add another section to his greenhouse to accommodate such subjects as African violets, poinsettias, Christmas begonias, camellias, amaryllis, gardenias, azaleas. These are plants for the warm house and require a night temperature of 55°-70°.

By maintaining the night temperature in their cool greenhouses constantly at 55°, some house gardeners successfully raise begonias, camellias, and African violets, along with cool temperature plants.

The new owner of a greenhouse will receive suggestions and advice from friends who garden under glass—and books will help him, too. We recommend *The New Greenhouse Gardening for Everyone* by Ernest Chabot. Two books, written for commercial floriculturists, contain information that is also valuable for the home gardener. While he may not want to add them to his own library, he may wish to refer to *Commercial Flower Forcing,* 5th edition, by Laurence Kiplinger, and to *Florist Crop Production and Marketing* by Kenneth Post. Copies of these books are available in the Library of The New York Botanical Garden and in other horticultural libraries.

Christmas morning in an owner-built "lean-to," with aluminum framework

THE CONSERVATORY

of Mr. and Mrs. Kenneth D. Smith, Dongan Hills, Staten Island. Overall dimensions — twenty-five by fourteen feet

The hanging baskets contain *Begonia Limminghei* and 'Ivy-Ever.' Mr. and Mrs. Smith also grow *B. foliosa* and *B. crestabruchi* because they show to advantage in baskets. They depend upon begonias more than any other plant group to maintain interest in their conservatory, for begonias are beautiful whether in bloom or not. They grow about twenty-five or thirty different kinds including a dozen or so Rex varieties for the sake of their gorgeously colored leaves.

Camellias and gardenias give flowers in winter; spider chrysanthemums are grown in the garden in pots, lifted and brought into the conservatory for late October and early November color.

The conservatory accommodates *Allamanda nerifolia, Anthurium Scherzerianum* and *A. crystallinum,* cymbidiums, *Dieffenbachia picta R. Roehrsi, Dracaena terminalis* 'Firebrand', philodendrons, *Platycerium Hillii,* and *Strelitzia Reginae,* or bird of paradise.

There are no benches — the flagstone floor is bordered along the three outside glass walls by a bricked-in earth bed four feet wide to give prominence to certain plants, and to vary the height of the beds the pots are set on large (twelve by fourteen inch) inverted pots. Ferns seed themselves in the soil of the bed and grow around the pot plants — and they are allowed to grow happily until they get in the way.

GREEN FACTORIES

By LaRue Spiker

PLUCK A LEAF from the poplar tree outside your door. Enjoy its brilliant green symmetry, and let no hunger gnaw your vitals while you twirl it between your fingers. You hold in your hand a bit of life snipped from the source of the world's food stuffs. True, you probably will not eat the poplar leaf; but you would soon starve to death without it and its kinfolk all over the world.

Green leaves are the food factories of the world. Without them, life as we know it would disappear from the face of the earth. Without them, our great symphonies would never have been written; there would be no bebop. The Golden Gate at 'Frisco would be unspanned. No ships would cross the seas, nor planes explore the skies. None of all the wonderful people on earth would ever have been born. There would be no laughter and no weeping; no birthing and dying; no creation and no rest. The dull silence of earth would be broken only by the sough of wind and water. The drab soil would lie barren of any living thing.

Only green leaves, with some unimportant exceptions, can manufacture the food stuffs animals must have for survival. Fortunately, the earth's surface is plentifully clothed with them. From the evergreen hardwoods of the tropics sweeping up through the deciduous and conifer forests of the temperate zones to the tundra of the arctic regions, the earth's surface wears a productive green cloak. Each leaf is busy manufacturing sugars and starches which we must have for nourishment.

Like our own bodies, leaves are made up of cells. Such is the structure of all living tissue. Cells are tiny box-like structures containing a mysterious substance called protoplasm.

Until the middle of the seventeenth century, men did not know that flesh and vegetable matter were something more than unorganized masses of solids and liquids. Cells are so tiny they cannot be seen by the naked eye. Man had to wait for this knowledge until a spectacle maker in Holland invented the compound microscope in 1590. Today we would consider this first microscope a crude affair, but it made possible the first probing of an unseen world.

About seventy years later Robert Hooke, an Englishman with an insatiable curiosity, made some mechanical improvements on the microscope. Then he began to learn all sorts of startling things. He placed a very thin slice of cork under the microscope. To his amazement, he saw that it was not a solid mass but was built up from thousands of tiny boxes somewhat like a honeycomb. These boxes he called cells.

Later other curious men looked at living material under the microscope. Whether they took skin from their own fingers, a hair from their pet tabby, a tiny sliver of grass or a bit of raw potato, they observed the same thing. The walls of each cell contained a gelatinous substance.

They called this viscous material "protoplasm" from the Greek words meaning "first form." It is the life stuff of the world. All living things, whether plant or animal, are made of these tiny boxes of protoplasm. Since Hooke first rode his curiosity into the minute world of cork cells, we have discovered a great deal about the nature of protoplasm and why it works the way it does.

It is complex stuff made up of many parts and substances. Countless sage and conscientious men have spent their lives analyzing and studying it. But the final question remains unanswered. What makes it live? Our scientists have never been able to create it satisfactorily in the laboratory; yet it renews and recreates itself constantly with the simplest of materials in the world about us. It is the mystery of life itself. Some day, if man does not destroy himself first, we shall find the answer.

Although this life-stuff, protoplasm, is essentially the same in plants and animals, there are some important differences. Indeed, it varies somewhat from plant to plant and from animal to animal. It is the reason plants look and function differently from animals. It is the reason a plant can perform a miracle of which no animal is capable.

Plants can manufacture food from raw materials, which would nourish no living thing before the leaf worked them over. Your life depends on minute particles in plant protoplasm which you will probably never see unless you are a scientist. You see only the green color they give to the leaves. These minute particles are not present in animal protoplasm. Even the green frog, like you and I, must get his food ready-made.

These minute bodies in plant protoplasm are called plastids. Plastids are a very small part of the protoplasm of each cell in each leaf on each plant. However, without them the leaf would not be green. Indeed there would be no leaf, no frog, no you and I.

Plastids bear a green pigment called chlorophyll. Chlorophyll, through a process not yet fully understood, enables other components of the protoplasm to use the energy from sunlight to manufacture a chemically simple sugar from carbon dioxide and water. Only the cells of green leaves, and to a limited extent green stems, contain chlorophyll in the right relation to the rest of the protoplasm for accomplishing this manufacture.

Botanists have a name for this manufacturing process. They call it photosynthesis, which literally means a putting together by light. Only green plants can use the energy of the sun to "put together" inorganic materials—water and carbon dioxide—in such a way that they become the food stuff for living. The simple sugars resulting from photosynthesis undergo further chemical change and become the sugars, starches, fats, and proteins which are food for us and the lower animals.

Pick up a single leaf, and you hold a very tiny factory. Put together all the leaves in the world and you have "big business." Its size dwarfs the output of human industry.

Photosynthesis is by far the largest single manufacturing process on earth. Scientists estimate that plants produce a trillion (1,000,000,000,000) tons of organic carbon each year. In 1953 all the steel plants in the world produced only 230,000,000 tons of steel, or about 2/10,000ths of the amount of carbon produced by green plants.

We eat the food stuff produced by green plants to obtain the physical energy which enables us to work on the production line or paint a picture, play tennis or piece a quilt, explore the bowels of the earth or just sit and think. We munch an onion — food the plant

has stored at the base of its leaves. We wolf down beans — food the plant has stored in its seeds. We eat a lettuce leaf—food stored in the leaf itself. Maybe we can afford a thick steak—animal flesh built out of the food stuffs manufactured by grass and corn. We get the energy to play tennis from the energy green plants have taken out of sunlight. They store this energy in foods which our body burns as fuel to make us go.

You owe a great deal to the leaf waving from the debonair little poplar tree outside your window. Take a closer look at this leaf. Simple and rather pleasing in appearance, isn't it? Clear, shiny green, lighter on the lower surface. Heart-shaped with toothed edges. A rather long, slender stem which becomes a central vein extending the length of the leaf with smaller veins branching off. Hold it up to the light, and you can see that the leaf is criss-crossed by a vast network of tinier and tinier veins.

Thus are all leaves constructed—a system of veins, which are conduits for water and mineral salts, and the working tissue, which does the manufacturing. Beyond this point the structure is far from simple.

If you—like those men of active and disciplined curiosity, our research scientists—could take a very thin cross-way slice of the leaf and peep down the long tube of a microscope at it, you would see a strange sight. You would be getting a humming-bird view from the edge of the leaf.

First you would notice that both the upper and lower surfaces of the leaf are covered by a series of flattish cells fitted snugly together a bit like long paving blocks. These tough colorless cells form the leaf's epidermis. They serve much the same purpose as your own skin—protection of the inner tissue from injury and excessive loss of water by evaporation.

The epidermis is perforated by many tiny pores, called stomata, which comes from the Greek word for "mouth." Each opening is guarded by two lip-shaped cells, somewhat as the opening of your mouth is guarded by your lips. Each stoma opens into an air chamber which is connected with other air chambers inside the leaf. The lip cells can open or close the stoma in response to certain slight changes in the surrounding epidermal cells. This action is so simply devised and so effective in relation to the needs of the plant that we would feel very clever, had we thought it up ourselves.

Just inside the epidermis is a single layer of "palisade" cells. These cells look a bit like closely packed cylinders with one end fastened to the inside of the epidermis. The other cells inside the leaf are shaped like irregular beans. These cells wall the air chambers mentioned above. The palisade cells and the bean-shaped ones are the business cells of the leaf. They contain chlorophyll.

The leaf works this way.

Carbon dioxide from the air passes through the stomata into the air chambers of the leaf where it is absorbed by the cells. Water, picked up by the roots, is carried through the veins to the air chambers of the leaf where it is also absorbed by the cells. Through a complicated series of chemical reactions, the carbon dioxide and water molecules are knocked about and reformed into a simple sugar compound. This is the rudimentary manufacturing process of the leaf. It takes place only in those cells containing chlorophyll, which in some mysterious way utilizes light as the source of energy for the process.

You could sit all day in a shallow pond, carbon dioxide molecules bombarding you and sunlight bathing your skin, without manufacturing a single ounce of sugar. But then, you are not a leaf!

★

"Nature looks ahead and makes ready for the new season in the midst of the old . . . the present season is always the mother of the next . . . before nature closes her house in the fall, she makes ready for the spring."

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So The NewYork Botanical Garden,

while completing its work for the year 1955, is busily engaged in laying plans for expanding its services to members in the year ahead.

To all members and friends, The New York Botanical Garden expresses its sincere appreciation of their continuing interest and support and extends best wishes for health, happiness, and prosperity and

"Peace on Earth
Good Will to Men."

OF TRUFFLES (from page 8)

wherever his masterpieces can be found. The former, *tartufi bianchi,* seem to come into commerce only from Italy; the latter, consisting of the two species, *Tuber melanospermum* and *Tuber brumale,* grow in the same areas in France and Italy, and are sold and used together, as *truffes de Périgord* and as *tartufi neri di Norcia.* Of the few American truffles that have been tasted some are bland, and some delicately aromatic; none have been found in sufficient abundance for even experimental cookery.

And cookery is, after all, the chief test of the truffle. Various often contradictory properties have been ascribed to them in folk medicine. From the point of view of dietetics, truffles are roughly comparable to oysters, having about 71% water, 10.4% protein, 0.4% fat, 15% carbohydrates, and 2.6% mineral substances, and because they contain much less water are approximately twice as rich in these materials as are cultivated mushrooms. They are relatively rich in protein and mineral, and relatively low in carbohydrate and fat. But truffles have not been appreciated for two thousand years merely as a means of sustaining life. Their value has always lain in their ineffable odor and flavor. These excellences are so rich and pervasive that a small quantity of truffles suffices to transform a whole dish: a few minced truffles in an omelette, or in the stuffing of a fowl, can raise a workmanlike product to the rank of a work of art. They can be eaten alone, baked in butter, or wrapped in a strip of bacon and broiled; but more commonly they are distributed through some other substance — as in *pâté de foie gras.* However used, they justify to the favored consumer the growth of the forests, the labors of the hunters, and the inventiveness of the student of food, all of which combine to make possible the experience of the dish *aux truffes.*

Disease Resistance and Plant Tumors

By **Richard M. Klein**

THE RESISTANCE of plants to disease is big business. Both in this country and abroad seedsmen spend millions of dollars developing plants for home gardens and for farms that will be immune to plant pathogens and to adverse conditions. These efforts are supplemented by the work of state and federal agencies, notably the experiment stations attached to state universities and units such as the Federal Agricultural Research Station at Beltsville, Maryland. Immense benefits have been reaped by these efforts and the people of this country are better off for the scientific activities of our geneticists, horticulturists, and agronomists. The breeding of cotton and melons against the ravages of fusarium wilt in 1899 by Dr. C. Orten of the U. S. Department of Agriculture and the isolation of wilt-resistant flax in 1901 by Dr. H. L. Bolley in North Dakota's famous Agricultural Experiment Station were two of the landmarks that changed plant pathology from a branch of mycology into a science in its own right. Since these early beginnings, many of our most serious plant diseases have been controlled by breeding of resistant varieties, and today every gardener routinely buys seed known to be immune to disease.

There is, however, another phase of disease resistance that has garnered few, if any, headlines. This revolves around the question: "Why is plant A resistant to a particular disease, while plant B is susceptible?" It is at this point that the plant physiologist enters the problem, for he deals in the "Why" and "How" of the nature of plant activity.

There are two major reasons for studying why and how plants are resistant to disease. The first is the rather obvious one that until we know the possible methods plants use to ward off disease we cannot methodically breed or select for any particular character which may have positive resistance value.

The second reason, although less apparent, is perhaps more important. By determining the reasons for the failure of disease to appear on a plant we may be able more precisely to block out the chain of interlocking events which, together, result in the observed activities of living cells, whether plant, animal, or human.

In plants there are some striking examples of physiological disease resistance. About twenty years ago a variety of wheat was found that showed excellent resistance to extremely virulent strains of black stem rust, a disease whose activities cost American agriculture millions of dollars annually. Physiological studies showed that the fungus spores germinated normally on the plant, penetrated the epidermis and then suddenly died. After several years of work it was found that this highly "resistant" plant was really "super-susceptible," for the fungus actually killed the sensitive invaded cell and then died for lack of proper nutrients. Crosses of these plants with those possessing other desirable characteristics, such as high yield, etc., have resulted in the development of strains of wheat that are now planted throughout the country.

Analogous host-parasite reactions occur in potato tubers resistant to potato wart and also in clover resistant to powdery mildew. In some other well-studied cases it was shown that the pathogen produces indoleacetic acid — the "hormone" used extensively to root cuttings. This compound causes the sensitive resistant plant to produce a callus, much like that produced on cuttings, which prevents the fungus from traveling throughout the plant. The presence of natural fungicides in brown-skinned onions is another mechanism of disease resistance.

The formation and development of crown-gall tumors present several interesting examples of disease resistance. This disease is caused by a bacterium *(Agrobacterium tumefaciens)* that in-

Standardized discs of carrot tissue showing the range in size of crown-gall tumors formed on the surface of the discs

duces cells of susceptible hosts to become highly active, dividing in a cancer or tumor-like manner. It is economically important for rose breeders, producers of fruit crops and to many nurserymen. More important is its significance as an experimental test system for studies on the physiological and biochemical activities of cells, since it represents an easily controllable, permanent alteration of normal cells into tumor cells. It is with this latter consideration in mind that the Laboratory of The New York Botanical Garden has been engaged in studies on crown-gall for many years (Cf. Robert S. DeRopp, Journal of The New York Botanical Garden, September 1950.)

About ten years ago a list of plants susceptible and resistant to crown-gall was compiled and, with one possible exception, it was noted that none of the monocots were susceptible, although at least one member of every order of dicots could form tumors. In spite of a great deal of work, no reason for this sharp taxonomic separation has been found. Begonias, too, are generally resistant, but this has finally been explained. It was known previously that the causal bacteria could not live in acid media (below pH 5.0) and workers found that the cell sap of most begonias is even more acid than this value. Other resistant plants contain antibiotics which kill the bacteria and still other plants have, or form, mechanical barriers to the invasion of the tissue by the bacteria. These findings are similar to those found for other host-parasite complexes.

When the author came to The New York Botanical Garden, a search was made for a host plant showing certain definite properties which were important for physiological studies on crown-gall tumors then under consideration. The plant organ had to be available throughout the year in good supply and at low cost. It had to be a storage organ to simplify the experimental procedures, since supplying nutrients is a difficult job under laboratory conditions. It could not be photosynthetic for the same reason. As the final hurdle, the plant chosen had to be structurally simple so that tissue isolations could be made easily. After months the choice narrowed down to potato tubers and carrot roots, and the carrot was finally selected since tumors form on carrot more readily than on potato.

Within a few more months the small but important details of the technique for obtaining uniform pieces of tissue under aseptic conditions were worked out, and the laboratory began an intensive study of crown-gall tumor formation on discs of carrot tissue with a standardized technique for quantitative experimentation. It was at this point that we noted some unusual responses in our tests. Although tissue from a single carrot acted in a uniform manner, some carrots were completely resistant to tumor formation and a wide range of susceptibility—from a weak reaction on up to strong reactions with voluminous tumor formation — was noted (see fig. 1). Now, this same phenomenon had previously been observed at the Garden when Dr. R. S. DeRopp was here, and his published scientific report was available. Using his work as a base for additional studies, we decided to find out *Why* some carrots were resistant and others susceptible to the tumorogenic action of crown-gall bacteria, and *How* this finding was related to the tumor problem as a whole.

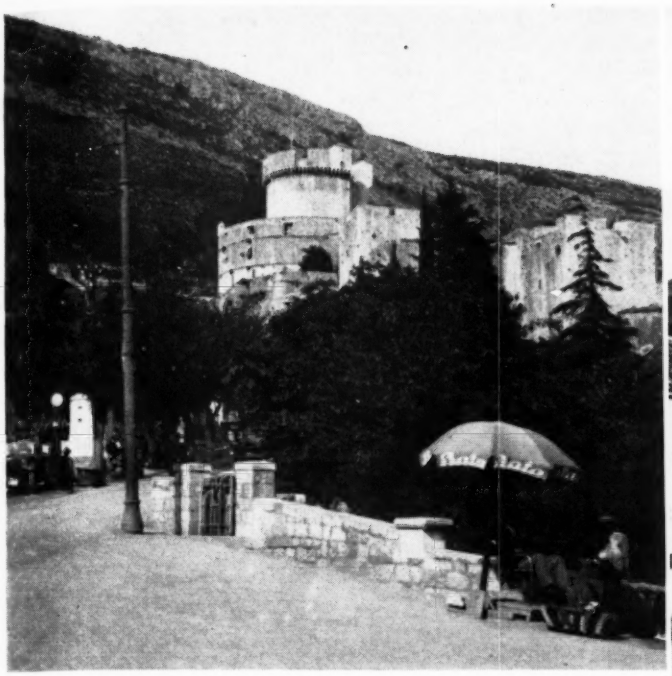
The first experiments were oriented by the available knowledge on known mechanisms of disease resistance. These experiments were, however, unsuccessful for the test tissues were not hypersensitive, did not contain a chemical inhibitor of tumor formation (although tissues of carrot roots other than those used for our experiments did contain an inhibitor and the carrot tissues had the proper acidity, etc.).

The next line of attack proved to be more profitable. Knowing that the resistance of carrot to tumor formation was not due to the *presence* of some inhibitory mechanism, it was possible that it was due to the *absence* of some factor necessary for tumor formation. Of course, this possibility was the more exciting for it was possible that, were this the case, we might find out more about the process of tumor formation.

The first evidence that this line of reasoning might be correct was obtained when discs of susceptible and resistant carrot tissue were clamped together in the presence of the bacteria. Under these conditions, the resistant tissues formed reasonable amounts of tumor tissue and control discs, which were not in contact with susceptible tissues, formed no tumor tissue. Our next series of experiments were directed at proving this hypothesis. Susceptible carrots were ground in a meat chopper, and their juices squeezed out in a laboratory model hydraulic press. After removing large particles, the juice was sterilized and minute amounts added to the surface of resistant carrot tissues. These discs formed good tumors and untreated discs, or those treated with the "wound juice" of resistant carrots, formed no tumors under otherwise identical conditions. Furthermore, juices from other susceptible hosts are active on carrot tissue. These experiments, and others, have answered the "Why" question. Some carrots are resistant to tumor formation because their juice lacks a compound, or compounds, which are necessary for tumor formation. The relative amount of this compound in an individual carrot has been shown to determine just how much tumor tissue will form on that carrot when it is inoculated with crown-gall bacteria. The fact that this factor is present in plants other than carrot suggested that the finding was of general biological significance and not simply a property peculiar to carrot. At the present time, we are inclined to believe that this "susceptibility" factor may be one of the factors necessary for tumor formation in all susceptible plants.

The "How" question is still being studied, and many carrots have gone through our "carrot factory." At this writing, we use about three hundred carrots each week, saving only those which are resistant and hence used as the test system for a bioassay of this "wound juice factor" and those highly susceptible carrots whose juice is the source of the factor.

The chemical facilities of the laboratory are being used to fractionate the juice in an effort to determine its chemical nature. This is in itself a difficult task, for the juice factor is active in extremely minute amounts. At the same time, physiological experiments are being conducted to determine just where in the still mysterious chain of events leading to tumor formation this factor is necessary and how it works. The elucidation of these problems may be important, not only to our understanding of tumor formation in plants, but may have implication in other fields of cellular biology.



Seacliffs of Dubrovnik, favorite locality for the wild caper

Left, above. Fortifications surrounding Dubrovnik; barren, eroded *karst* landscape beyond

IMPRESSIONS OF YUGOSLAVIA

By Otto and Isa Degener

ITALY, a land selected by so many tourists and honeymoon couples, attracted us also. So in the spring of 1953 we ran through and over Venice, Florence, Rome, Naples, and beautiful Capri with others of our kind. On our return to Germany, it occurred to us that we should visit the Dalmatian Coast of Yugoslavia also. After receiving last minute verification from the American consulate that it would be permissible to visit this Communist nation, we left Munich shortly after noon one day, flying southwest over the Alps to Zagreb, Yugoslavia. Here we tarried about an hour for customs and other inspections and then enplaned for Grado Airport, reaching it at half past seven. A picturesque moonlight ride of an hour by bus brought us to Dubrovnik.

In Italy we had missed intimate contact with land and people by living in tourist hotels and by being herded through as many palaces, museums, cathedrals, and other attractions as possible by efficient tourist guides. We had returned to Germany exhausted. This time we were wiser. Beautiful Dubrovnik captivated us, and, we decided to make this ancient city our headquarters for the three weeks at our disposal. With the aid of Putnik, the Government travel bureau, we rented a double room in a private home overlooking the blue Adriatic in a native quarter of the city. The rate was $1.00 per day per person, including breakfast. Our hostess led us to places of interest to which tourists never come. She entertained us with stories about customs and uses, and showed us about her ancient city with the love and pride of a native Ragusan. We were surrounded by native color.

When in the city, why did we hear the word Ragusa at one time and Dubrovnik at another? The city has a two-fold origin. Fugitives from Epidaurus early settled on the rocky isle of Ragusium. A short distance away, across the channel, was the native Slav town of Dubrovnik. With the gradual filling in of the separating channel with rock, earth, and city debris, the settlement known as Ragusa amalgamated with the town Dubrovnik in the eleventh century. Through successful wars and clever diplomacy such as the payment of tribute to all-powerful states—sometimes to Turkey, which long ruled the hinterland; sometimes to Venice; and sometimes to Hungary and Croatia—this twin city, now massively walled, retained much of her independence. She gained in wealth, power, and culture. With the discovery of America, however, the importance of Dubrovnik and her more powerful rival, Venice, gradually waned as Europe's shipping with the Levant and the Orient lost importance in favor of that with the New World. The death knell came to Dubrovnik with the disastrous earthquake of 1667, and her final loss of independence as a city state to Napoleon in 1806.

The ancient city wall of limestone

and the fortifications are completely intact to the present day. It is possible to walk around the entire city on top of the wall, ever seeing new fascinating vistas of the city, mountain, and sea. The pathway on top of the wall is fifteen stones wide, each stone over a foot across. We even botanized here, collecting a pale violet campanula growing from the crevices and, where exposed to ocean spray during severe storms, a night-blooming shrub (*Capparis spinosa*) with long, pendent branches. The pungent flower buds of several cultivated forms of this plant furnish the capers of commerce.

The entire city, with its many storied houses with red tile roofs, is today a museum in itself. It is divided by narrow streets, some with steps leading up the side of Mt. Srdj (whose name we could never learn to pronounce correctly); others, blind alleys. We shall never forget the mischievous smiles of urchins when we got lost in a cul-de-sac of streets in our search for the public market. Here, at about seven o'clock in the morning, we were wont to purchase ripe, honey-sweet figs at three to four and a half cents per pound and purple grapes at five to eleven cents per pound. These, with perhaps bread and cheese or sausage, and a bottle of claret would serve us for lunch and supper. Near the market was the aquarium, a building formerly one of the main battlements of the city. Though not as imposing as the famed aquarium of Naples, its exhibits were far superior.

Outside the city walls extend the suburbs and gradually the country. Here cypresses, pines, aloes, pomegranates, fig and olive trees, and, about the houses, flowering oleanders or occasional bougainvilleas typify the landscape. The contrast in color between the tall, sombre cypresses and the white, bare wastes of limestone rock and rubble is particularly striking. Such terrain, bereft of top soil and known as *karst,* is the result of erosion after man chopped down the ancient forest and permitted overgrazing by goats and other livestock. Today the native vegetation is for the most part xerophytic. It is practically an association consisting of the remaining underbush and is known as *macchia.* The component shrubs and herbs appear as though they might belong to a very few genera and families until their bursting into flower proves otherwise. Then we can identify many oil-rich plants like myrtles, verbenas, rosemary, and other labiates which impart, particularly on hot, sunny days, a pleasing fragrance to the entire air. Of these we collected specimens as well as of heathers *(Erica verticillata, E. arborea) Smilax aspera, Quercus ilex, Genista, Pistacia Lentiscus,* a bluish eryngo, and various rockroses.

The olive orchards interested us. In Italy they were neat and in thriving condition; in Yugoslavia, otherwise. In fact, several pursuits of agriculture in these two nations on opposite sides of the Adriatic impressed us favorably and unfavorably, respectively. Though interested in plants and not politics, we were pretty well convinced that former owners of now nationalized orchards had lost interest in their cultivation. This mute evidence should be eloquent enough to convince men and women of average intelligence what political ideology is the better one.

The olive trees were fascinating! A tree may have been started from seed several hundred years ago. It very likely grew lustily at first, and then started to rot within. As more new wood was formed by the cambium under the bark year after year, so the old wood toward the center, like that of a neglected apple tree, decayed and fell away. An ever enlarging hollow trunk thus was formed, carrying branches that yearly bore flowers and fruit. Finally longitudinal rents formed through parts of the trees, eventually isolating strips of trunk bearing healthy branches. Hence, near where one tree had stood hundreds of years before, now stand two, three, or even four separate trees—true clons. Evidence of their origin is shown by their peculiarly gnarled appearance. When we realize that the olive was readily propagated by ancient husbandmen by slips and cuttings, many of these clons may have originated actually a thousand or more years ago.

From Dubrovnik we rowed to Lokrum island, where King Richard the Lion Hearted once took refuge. We motored also to Cetinje, the capital of former Montenegro. Thus in three weeks, at an outlay of less than three hundred dollars, we gained a good general impression of the people and plants of an interesting part of Yugoslavia.

About STARTING SEEDS

By **G. Carl Ball**

WE SHOULD LIKE TO dispel the old notion that it is difficult to start seeds indoors.

What are the components that are necessary in starting seeds—and how are they used? Let's take them up one at a time. First, in order to have blooms outside before the summer is half over, we must start the seeds indoors four to eight weeks (depending on variety) before it is safe to plant outside, which means after danger of frost has passed. It is not wise to start seeds earlier than this, unless you have a well-heated small greenhouse, because your window space will be too limited to hold any quantity of seedlings after transplanting, and your coldframe will not be warm enough until the last couple of weeks. By starting seeds at the time suggested, the seedlings may be moved into your coldframe when they are transplanted and before they have become tall and spindly. Light and space are important points to consider before sowing any seed.

The next components are the container and the material in which the seeds are to be sown. For starting seeds in the home, we prefer small containers, such as cigar boxes or shallow clay "bulb pans" rather than large "flats," which are hard to handle. If you use soil, be sure that it contains a liberal quantity of sand and leafmold or peatmoss. The exact proportion will be determined by the condition of your soil —whether it is naturally heavy or sandy. Most seed sowing materials should contain about one third each of soil, sand, and leafmold or peatmoss. The soil mixture should be sterilized (or more properly, pasteurized) to kill weed seeds and harmful organisms. Florists use steam, but you can accomplish the same purpose by heating the soil mixture in a dishpan in an oven for forty-five to sixty minutes at 200°-250°. The soil should be moist but not wet and may be used as soon as it cools.

Vermiculite also gives excellent results in seed starting. It holds moisture well and is entirely free from weed seeds and harmful organisms; but since

it contains no nutrients, these must be added as soon as the plants are up. Liquid plant foods, used as the manufacturer directs, or dry commercial fertilizers of the balanced sort, such as "Vigoro," may be used by dissolving one and a half teaspoonsful in a gallon of water.

Another vitally important component is uniform moisture. The sowing material should be placed in the container in a well-moistened condition and firmed with a board. Upon this place a one-quarter inch layer of the same material which has been screened. Use a board to level the material even with the top of the container but do not pack. Shallow rows are made by pressing the edge of a wood pot label or lath into the sowing material slightly. The seed is sown thinly in these rows. No soil covering is added, if seeds are the size of snapdragon seeds or smaller; if larger, barely enough to hide the seeds. Remember, seeds need oxygen to germinate as well as moisture, and a heavy covering will literally smother them. A light misty spray with a rubber bulb "Scollay" sprinkler will settle the seeds in the soil or vermiculite. A newspaper cover will help to prevent loss of moisture by evaporation, but be sure to examine the seed boxes or pans daily to see that they are kept uniformly moist, and be sure to remove the paper and place the container in full sunlight as soon as the seedlings are up. It is a good idea to label each item you sow with its name and the date sown; four-inch wooden pot labels are ideal for this purpose.

After the seedlings are well up, we like to provide moisture by "sub-irrigation" — sounds formidable, but it is really very simple. The seedling containers are placed in water to about half their depth (in a cheap cake pan or the laundry tub) and allowed to remain until the surface is moist. This will not work, of course, if the containers are waterproof or have no drainage openings. Immersing the seedling containers helps to control "damp-off" by keeping water off the leaves and stems and insures thorough watering of all the soil.

The fourth important component is temperature. Most annuals will sprout quickly in a uniform temperature of 60°-65°; after germination, a sunny location with a night temperature of 55° and a day reading of 65°-70° will help to avoid spindly growth. When the seedlings have been transplanted into other containers and placed in the coldframe, a night temperature of 45°-50° and not over 65° on sunny days will help to produce nice stocky plants.

A coldframe may be constructed as a simple box with wooden sides, the back of which is six to eight inches taller than the front so that a sash of glass or glass substitute may be placed on it in such a way that it sheds rain and keeps out some cold at night, and can be raised or completely removed on mild, sunny days.

In transplanting the little plants to the garden, take care in watering every plant thoroughly and regularly thereafter, if rain should fail, until they are well established.

CHECK LIST FOR GERMINATION TROUBLES
SUFFICIENT MOISTURE? ABSOLUTE NECESSITY — UNIFORM - NOT EXCESSIVE.
ANTS-MICE — MORE OFTEN RESPONSIBLE THAN PEOPLE GENERALLY REALIZE - EVEN FLORISTS!
CORRECT TEMPERATURE? — USUALLY 65 - 70° — SOME PLANTS COOLER.
CLEAN, DISEASE - FREE STERILIZED MEDIUM?
SEEDS COVERED TOO DEEP? AIR IS AS ESSENTIAL AS HEAT AND MOISTURE!!! FINE SEEDS REQUIRE LITTLE OR NO COVER — WILL "WASH" INTO SOIL.
YOUR SEEDSMAN IS ONLY HUMAN -- DOES HIS BEST. IF YOU THINK HE IS AT FAULT, WRITE AND GIVE HIM A CHANCE TO HELP!
ABOVE ALL, REMOVE SEEDLINGS TO COOL AIR AND PLENTY OF LIGHT AS SOON AS SPROUTED - - BEST DAMP-OFF PREVENTATIVE!

KNOW WHAT TO DO (from page 2)

them in sunny windows in the living and dining rooms and elsewhere in the house.

To force forsythia into flower at this time of year, takes about four weeks; later on, it can be forced in three weeks.

If you are growing *Lonicera fragrantissima,* bring several branches indoors. You'll find you can force this sweet honeysuckle easily. Even though its dainty flowers are fleeting, they will delicately scent a room for two or three days. Pussy willow forces quickly—and it delights the young members of the household.

Examine dahlia tubers, gladiolus corms, and bulbs to be sure they are keeping firm. Gladiolus corms should be treated with a 5% DDT dust before being stored, or they may be stored in naphthalene flakes.

A task for a balmy spring-like day—and such a day does occur in mid-to late January—prune the old stems of late-flowering shrubs to the ground. This will allow ample room for the growth of the young stems.

Also prune weak, broken, or dead branches from fruit trees. Pruning to shape fruit trees is now recommended to be done in summer—the theory behind this is that fewer fruit buds are lost for the following year's crop.

Prune grape vines — early winter pruning is necessary to avoid excessive bleeding. This task can be deferred till middle of February, but not later.

Clean, repair, and oil garden tools and power equipment — have lawnmowers sharpened and adjusted. Clean, repair and paint garden furniture. Put everything away neatly for the winter in its proper place — and in good condition.

During a spell of mild weather, with the thermometer registering 40° or so, apply a dormant spray on lilacs, fruit trees.

Depending upon the weather, you may have to postpone the dormant spray until the first two weeks of

February—

During this month, you can complete repairing and painting tools, rose trellises, dahlia stakes, garden furniture—if you failed to get all this work done in January.

Of course, you will continue to syringe the dust from the foliage of your house plants, and to feed and water them regularly, and to pick off weak or dead leaves. You will have to wash the flower pots every now and then to remove the whitish sediment that gathers on them—African violets especially dislike this discoloration.

Ventilate the coldframe on sunny days — otherwise the temperature may rise quickly and encourage premature growth.

Daffodils, hyacinths, crocus, and grape-hyacinths can be lifted from the coldframe and brought into a glass-enclosed porch, or a warm sunny room.

By the end of February, begin to turn over soil in the vegetable garden so it will be ready to receive an early planting of onion sets and peas.

RHODOPHIALA BIFIDA

By Wyndham Hayward

AT LONG LAST the amaryllid lovers apparently can feel comfortable about one of their favored delights in the floral kingdom again, now that it has come to rest on the perch of *Rhodophiala bifida* (Herb.) Traub. This is a long-desired occasion, for this "ox-blood lily" is a precious thing, which has been bandied around in several related genera and hidden under erroneous specific appellations for far too many years.

Dean William Herbert described it first as *Habranthus bifidus* back in 1825 in the "Botanical Magazine." He accompanied it with a good illustration, which is, however, typical only of the plant just coming into flower, not at all at the peak of its flowering, when the full four or five blooms will be extended and expanded. He admits, "the flowers of this genus expand in the sun . . . and probably those of *H. bifidus* are at times much more open, than when our sketch was made from a fresh specimen, carefully brought to us in a tin box, by J. R. Gowen, Esq., from 'Highclere'" (the family estate).

Dean Herbert was the third son of the first Earl of Carnarvon, who died in 1811, so it was doubtless his brother, Henry George, the Second Earl, who was in possession at "Highclere." Herbert and Baker, in the latter's *Handbook of the Amaryllideae,* 1888, state merely, without further identification, that the bulb was introduced by "Lord Carnarvon," from Buenos Aires. Arthington Worsley, the late British amaryllid specialist said in the 1937 "Herbertia," "His (Herbert's) *father* personally introduced several species into cultivation in 1820, including *H. bifidus,"* but this is obviously an error.

So, unless the species had been brought in before 1811, in which case it would have been fourteen years before Herbert published his description, an unlikely thing, it must have been the brother, Henry George Herbert, the Second Earl, who introduced this plant from Argentina. Little is known of Henry George, who died prematurely in 1833, but we welcome his name to the already long fraternity of amaryllid lovers and sponsors in the early nineteenth century.

Judging from the Worsley and Baker reports, this second Earl also introduced *Amaryllis stylosa* and produced an early hybrid of the *Amaryllis Johnsonii* type, called *Amaryllis Carnarvoni* by the great A. P. DeCandolle when he published a plate and account in the rare work, *Plantes Rare du Jardin de Geneve* (Geneva) 1829. DeCandolle's plate of this second Earl's plant is one of the early known published illustrations of *A. Johnsonii.*

Sprengel referred Herbert's *Habranthus bifidus* to *Amaryllis (Amaryllis bifida)* in 1827. Continuing this concept, J. G. Baker listed it as *Hippeastrum bifidum* in his Handbook, 1888, having made the actual transfer in the "Journal of Botany" in 1878. Traub and Uphof called it *Amaryllis bifida* again in "Herbertia," 1938, and just recently on good cytological grounds, Traub has referred it to the early genus *Rhodophiala,* of Presl, which he restored in 1952 to accommodate the small-flowered species of the genus *Amaryllis.*

Baker in 1888 and Traub & Moldenke in 1949 in their monographs had maintained *Rhodophiala* as a sub-genus of *Amaryllis* (Subgenus II, Traub-Moldenke), but the species *A. bifida* was not placed under the sub-genus *Rhodophiala* at that time, but under Subgenus III, *Phycella.*

E. L. Holmberg, the famous Argentine botanist, in his *Amarilidaceas Argentinas* of 1906, lists the following provinces and areas as locations of this plant in the wild: — Buenos Aires, the plains of Buenos Aires and Montevideo, Entre Rios province, and the hill of Santa Ana in Misiones province. Holmberg says collections of such *Amaryllis* in Buenos Aires *"son muy sospechosos,"* but the eminent Dr. Alberto Castallanos of Buenos Aires, one of Latin America's greatest botanists, advised the writer some time ago that this species could be found growing native in the suburbs today.

As previously indicated, Dr. Hamilton P. Traub referred *Amaryllis bifida* to the re-established genus *Rhodophiala* of Presl (originally outlined in 1844 to accommodate the small-flowered species of *Amaryllis*), the new combination being published in *Euclides,* 13, 156, 1953. This was following cytological determination by Thelma Ficker (published in "Plant Life," 1951) that the basic chromosome number of *R. bifida* is nine whereas in the large-flowered, broad-leaved *Amaryllis* it is eleven. This explained the long-reported failure of the two types to cross under careful hybridization efforts.

This over-long sketch of the botanical background of our plant, widely grown in southern United States as the ox-blood lily, is really much condensed over what might be related, and the bulb history still has to cover horticultural mistakes of species. For many years it has been known as *Amaryllis advena* (now *Rhodophiala advena*) from California to Florida, where it has virtually become naturalized in gardens.

However, *Rhodophiala advena* is a Chilean species which, it seems likely, is not present in United States gardens today unless in some rare collection. Until recently it *(R. bifida)* had been

listed as *Habranthus advenus* in the Dutch and other European catalogues; Van Tubergen, leading Dutch rare bulb firm, has recently made the change to *Rhodophiala bifida.* The bulb is common where grown, offered by hundreds in Holland and available by thousands in the lower South.

There is a rosy pink variety, known as *R. bifida* var. *spathacea,* much scarcer than the type, but just as easily grown and even more beautiful. This *Rhodophiala* sub-group of the old *Amaryllis* complex, has long, slender, channeled, lush, green leaves, a quarter to three-eighths of an inch in diameter or more, and up to two feet long on well-grown plants. These appear at the time of blooming or shortly after. They are fall-blooming plants, similar in this habit to the *Lycoris,* and like *Lycoris,* they bloom with no or very little foliage. The stems are a foot to eighteen or twenty inches tall at optimum. There may be three to six flowers to the umbel, and the specific name comes from the strongly bifid character of the spathe enclosing the flowers. This is virtually hooked inwards at the top as the flowers emerge.

The blooms make good cut flowers and are cherished by the southern housewife for this reason. The plants are half-hardy, standing anything we have in the way of sharp frosts or light freezes in central Florida, say down to 25° F. without damage. This is hardly a surprise considering its native habitat, as the winter temperatures of Misiones, Entre Rios, and Buenos Aires provinces, Uruguay and Rio Grande do Sul, where the plant is native, go down to 15° on occasion.

This quality of hardiness to frost makes it a possible and desirable garden plant for the lower stratum of the South, around to the middle California area and possibly farther north in mild climate zones; doubtless anywhere the ground does not freeze deeply, as this species provides for its own protection in such contingencies, by pulling itself down deeply in the soil, when planted too shallowly. The process takes a year or two after planting if the setting is much too shallow. At one stage the bulb looks like a figure eight or hourglass, but the old bulb swelling at the top gradually disappears, leaving us with the new round bulb five or six inches underground.

Rhodophiala bifida (Herb.) Traub

Normally the bulbs retain their long neck in brownish black, papery scales when dug, but the neck may be broken off in digging or afterward with little injury resulting. Herbert speaks of the bulbs arriving from Argentina in round condition, but later pulling themselves down into the earth by their powerful contractile roots. The foliage appears in fall, lasts all winter, and dries off in late spring in Florida; the bulbs remain completely dormant all during the warm, wet summer with no rotting, until August or September, when abundant rains may bring two or three crops of the flowers.

They thrive best in a light sandy loam, with some moisture, but will endure part shade. They are satisfied with a hot, sunny location with no shade whatever, and in a sandy loam that will grow almost nothing else without fertilizer. Feeding with the usual bulb foods will help them, but patches at "Lakemont Gardens" continue to bloom year after year with no other attention than careful weeding twice a year.

A German settler, named Peter Henry Oberwetter, is reported to have first imported these bulbs into Texas. Dr. C. W. Hall, in "Herbertia," 1935, wrote some details about the man and his work with bulbs and stated he died in 1915. "Perhaps Mr. Oberwetter's most valuable importations were *Lycoris squamigera* and *Rhodophiala bifida.*" (Dr. Hall calls it *Habranthus miniatus,* one of the many mistaken "synonyms" it has had in southern gardens.) "Because of the ease and rapidity with which they are propagated, the *Habranthus* has increased in numbers until we have in Austin what is perhaps the largest supply of this choice bulb to be found in the nation."

It seeds well on occasion, especially in 1955 in Florida, but one scarcely needs this method as the bulbs multiply prodigiously in the course of years. One can lift and divide them every three years with good results. In some years the flowering is more profuse. The growing habit resembles that of *Cooperia pedunculata,* but the bulb shape is rounder, about one and a half to two inches at most in diameter. It is one of thirty-two species of these small-flowered amaryllids which have been transferred to *Rhodophiala.*

A glance at the original plate of *Amaryllis advena,* Ker-Gawler, published in the "Botanical Register," plate 849, 1824, the flower "bright vermillion, suffused and streaked with greenish yellow," the coloration being distinct from our bulb, makes one wonder where the error of nomenclature began. Even Traub and Moldenke (page 91) were not clear on this point in 1949, as they state under *A. advena* "this species is cultivated in the southeastern states, from Maryland to Florida and Texas, and also on the Pacific coast." As now known, this is in error. They save themselves in the confusion, by stating page 92, "there is a plant with ox-blood red flowers . . . which is cultivated in the United States that may belong here, but its status has not been definitely determined."

We now hope it has safely arrived as *Rhodophiala bifida* and will stay there a long, long time!

Dr. Taub thinks, in view of the two pink varieties (*spathacea* and *pulchra*) which have been reported, it would be a mistake to call this bulb "the ox-blood lily," any more. Think of having a "*pink* ox-blood lily," something manifestly absurd in nomenclature! He suggests calling it Uruguay lily, or La Plata lily. He reports it makes a good pot plant, several bulbs planted deeply in a large pot or "pan," and suggests they be watered very sparingly when dormant. The pots must have good drainage.

(Continued on page 32)

BOOK REVIEWS

GARDENS ARE FOR PEOPLE. Thomas D. Church. 248 pages, illustrated, indexed. Reinhold, New York. 1955. $10

It is well that Mr. Church's book appeared before the winter of gardeners' discontent set in in earnest. Whatever the season, it will cause many a flutter in the dovecotes of the pretty-pretty school of landscape gardening and be widely read by those who appreciate well-patterned gardens.

Glancing through these beautiful pages, we recall those precise, stimulating little gardens displayed in Paris some time back. Long have we waited for the echo of them, and here it is!

Mr. Church will doubtless gain many emulators who hold, and properly, that gardens are made for man and not the reverse, to which Mr. Church subscribes by adding to his own work examples of gardens designed by fellow landscape architects who also plant for people.

Stimulated by them, we shall probably see a crop of gardens where light and shade are as decorative as the plants.

Mr. Church's gardens are eminently planned to live in and care for with a minimum of effort. His directives are clearly tabulated and easy to follow. However, there still remains the item of upkeep, which he solves by using large areas of paving. Like boisterous small boys, even the best of gardens get out of hand and this corrects it.

A handsome book, this, full of good common sense, one to keep around and relish at leisure.

RICHARDSON WRIGHT
West Chatham, Mass.

OLD GARDEN ROSES, Part One. Sacheverell Sitwell and James Russell. 52 pages of text, 8 color plates by Charles Raymond. George Rainbird, Ltd., 8 Wyndham Place, London W1, England. 1955. $30

This very distinguished and beautiful volume is the first of a promised series of six on the subject. In scope, in quality, and in authority, the completed work will surely have, in its field, the same flavor and value that Audubon's *Birds of America* holds in ornithology.

A master of rose depiction, Charles Raymond has contributed eight color plates, reproduced by Van Leer of Amsterdam, in photo-litho offset. The result is breathtaking. A spray of roses has been plucked from its shrub, and every detail of form, color, petal, leaf, and thorn has been faithfully and lovingly painted, with no thought of "arranging" the rose, or subduing it to a portrait. The arbitrary shapes, the infinite subtleties and nuances of color, the texture and feel of the various leaves — the very disorderliness of the rose — are here in perfection. They have been given enormous pages, 17"x12", making, perhaps, an unwieldy book to hold or to place on one's library shelf, but the only fit space on which to reproduce such paintings. Let Redouté look to his laurels!

In the text, I suggest that you read Mr. Russell first, although his are the latter and fewer pages. He makes clear, or at least, somewhat less cloudy, the labyrinthine categories of the rose. By definition, "old" roses center on *Rosa gallica, R. damascena,* and *R. alba,* the garden roses found growing in Europe prior to the eighteenth century. Indeed, Russell lists them as "well-known to the Ancient world, and that at the beginning of the Christian era there were several varieties of these roses in cultivation in Europe." They were none of them "wild roses," that is, species roses, with the possible exception of *gallica. R. damascena,* the Damask rose, was long thought to be a wild species, but recent authority tends to say that it is a hybrid of *gallica. R. alba* is of mysterious origin, but nevertheless a hybrid. *R. centifolia,* the Cabbage rose, also a hybrid, may be included in these early ranks.

In the eighteenth century, hybridization, aside from natural hybrids, began to be practised and rose history becomes tangled indeed. Mr. Russell steers an interesting, if not entirely thornless path through this jungle.

Old roses had every quality, except one: continuous bloom. (It is true, they were short on yellow roses and omitted the long, tightly-rolled, elegant form.)

It was not until 1867 that a French hybridist, M. Guillot, produced the first hybrid tea rose, 'La France,' appropriately enough an ever-blooming, many-petaled pink rose with a lovely sheen. The rout of the "old" roses had begun.

With Mr. Russell's guide digested, the reader may turn to Mr. Sitwell's enchanting discussion of old roses: their scent, their origins and his favorites. He writes with the loving knowledge of the gardener, and the felicity of a poetic master of English prose.

FANNY W. PARSONS
Rye, N. Y.

ORGANIC GARDENING. J. I. Rodale. 224 pages, indexed. Hanover House, Garden City, N. Y. 1955. $3.95

The author of *Organic Gardening* is also the publisher of a periodical by the same name and much of the material in the book has appeared in the magazine. However, for reference purposes and for non-subscribers, it is convenient to have all the information between two covers.

The book deals with the age-old method of keeping soil fertile by the addition of organic matter rather than commercial fertilizers and maintaining healthy plants without the use of sprays. The author points out clearly the value of organic material in the soil to promote the growth of beneficial bacteria (which "wreck" the soil and break down old roots) and of fungi and earthworms. He also writes of the danger from too much nitrogen, especially on leafy edible plants.

The chapters on soils, the various methods of making compost which is considered both an art and a science, the use of the finished product and of mulches are the most important in the book, this reviewer believes. The necessity of oxygen, nitrogen, and carbon in the soil is dealt with in detail, which may or may not interest the average gardener. The author goes overboard in his condemnation of commercial fertilizers but advocates the use of rock powders which make up a large part of these fertilizers.

Whether or not one agrees with all Mr. Rodale's theories regarding the use of fertilizers and sprays as being detrimental to a person's health, they are nevertheless food for thought. *Organic Gardening* does make a gardener very conscious of the great necessity of organic material in the soil and of saving everything suitable for the compost heap. Then when he incorporates the finished product in the soil, not only is the texture improved but plant food has been replenished in nature's way.

OLIVE M. GUNNISON
Pawling, N. Y.

COMPLETE CULTURE OF TUBEROUS BEGONIAS. W. Othur Hillery. 138 pages, illustrated. Chieftain Press, Seattle, Wash. 1954. $4

The author of this small volume, an amateur grower living in the Pacific Northwest, has compiled an instructive and useful reference work on the culture of the present-day popular types of tuberous begonias. Obviously, it is written by an enthusiast who has achieved a large measure of success in his work and is willing to pass along to his fellow growers the results of his observations and findings.

There is a small portion devoted to the origin of the large-flowered begonias followed by descriptions of the various type flowers of the group into which they are usually divided. Mention is also made of the *multiflora* and basket type whose flowers are considerably smaller; *fuchsoides,* a small-leaved kind well suited to basket growing; *Evansiana,* sometimes referred to as the "hardy" begonia; *martiana,* etc., all interesting plants.

Chapters are devoted to the care of tubers during the resting period, their "sprouting" period and subsequent needs as to soil and growing conditions necessary for their best development. Propagation is dealt with thoroughly and details of the several methods of increase discussed. These are by seed, cuttings, and division.

How to grow specimens for exhibition, their preparation for the show and how to get the most out of a plant is given considerable space. In this connection, too, the various uses to which the cut blooms may be put is listed. While written by a grower in the Pacific Northwest and primarily intended as applicable to that general area, the cultural instructions given may, with adaptations, be equally valuable for other sections of the country.

EDWIN BECKETT
Stockbridge, Mass.

LANDSCAPING YOUR OWN HOME. Alice L. Dustan. 248 pages, illustrated (drawings by Henry H. Wiss); indexed. Macmillan, New York. 1955. $3.95

With kindly assurance, Miss Dustan in this small volume offers a great deal of valuable advice to the neophyte gardener and new home-owner. Drawing from long experience in dealing with garden problems, she attempts to help people to help themselves.

From subjects of space-allotment on a property, chapters follow which are concerned with masonry construction, barriers, trees, deciduous and evergreen shrubs, lawns and groundcovers and flower borders. Nearly every chapter closes with a list of required paraphernalia which might be used for carrying out a project, and an

enumeration of steps to be taken in precise order. To have covered less in the way of subject matter, and more detail in procedures might well be more encouraging. Surrounded with the materials and tools for some of the masonry construction, for instance, I am sure that procedures would be accompanied by frequent sighs. Procedure with a perennial border according to direction might be even more exasperating.

Illustrations demonstrate some good and some very mediocre use of plant material and one wishes that the author had illustrated this volume with plans and sketches of her own.

Even though the book has many weaknesses in structural arrangement and probably attempts to cover too much subject-matter in its 234 pages, one can well profit from heeding the quantity of good advice which is included.

HOWARD W. SWIFT

THE ART OF PLANT AND DRIFTWOOD ARRANGEMENT. Tatsuo Ishimoto. 125 pages, illustrated with 150 photographs. Crown publishers, New York. 1954. $2.95

I find it very difficult to appraise Mr. Ishimoto's work which, so it seems to me, is more akin to Bonsai, where plants with roots are used and miniature gardens are created, than it is to flower arrangement. Of course, my opinion may be somewhat prejudiced inasmuch as my own school of flower arrangement (Enshú) stresses very simple and stylized line effects.

However, Mr. Ishimoto has created arrangements which are pleasing and interesting. With the increasing popularity of driftwood he can do much to encourage a new art, some of which may fall within the province of flower arranging as is understood in this country. Nevertheless, as I have previously stated, much of the contents of this book will probably be classified as Bonsai.

MITSU ARAI
Greenwich, Conn.

PLANT TAXONOMY. Earl L. Core. 459 pages, illustrated, indexed. Prentice-Hall, New York. 1955. $7.50

This book avoids the criticism of being too technical and in so doing has the advantage of being a simpler, more informal introduction to plant taxonomy. The first half is occupied by well-written, and often entertaining, discussions of the history of the development of taxonomy, modern classifications, plant exploration, the origins of species, the evolution and migration of floras, climate and natural vegetation, gardens and herbaria, principles of taxonomy, nomenclature, literature of systematic botany, and finally a chapter each on vegetative and floral morphology. These last two chapters the author uses to present a much-abbreviated review of general botany, which may be of assistance to non-botanists. However, since it may be safely assumed that most students who use this text will already have completed a course in general botany, at least part of the space might have been more profitably taken up by more detailed considerations of the morphology of the vegetative and floral parts most often used in plant taxonomy.

The second half of the book contains the classification of vascular plants, that of the angiosperms in greater detail than for the other groups. Keys to the orders and to the families are presented and outline descriptions of the latter follow. To the description of each family there is appended one or more paragraphs in which are given the number of genera and species, brief discussions of the principal genera, distribution of the family, notable economic plants in the family, etc. Within the last few pages of the book is found a glossary of common Greek and Latin roots, an index to technical terms, and a general index. There are numerous illustrations of acceptable quality but this section would have been much improved by illustrations for each of the families.

The only serious faults are to be found in this second half, for inaccuracies of varying degrees of importance have occurred as the result, oftentimes, of the very brief, over-generalized familial descriptions. The fact that only about nine lines are used to describe the Leguminosae is some indication of the extent to which these descriptions have been reduced. The unfortunate result of such drastic cutting is that there are one or more exceptions to nearly every statement made.

Taking everything into account, however, this text may perhaps be more suitable for a survey type of course in taxonomy than other more formal and technical texts would be.

RICHARD S. COWAN

TREES AND SHRUBS OF THE UPPER MIDWEST. Carl O. Rosendahl. 411 pages, illustrated, indexed. University of Minnesota Press, Minneapolis. 1955. $6

This book, covering Minnesota, Wisconsin, northern Iowa, and the portion of the Dakotas lying east of the Missouri River, is an expansion and revision of the earlier (1928) *Trees and Shrubs of Minnesota*, by Dr. Rosendahl and the late Dr. F. K. Butters, both of the University of Minnesota. The present work includes keys, full descriptions, comments, some synonymy, numerous common names, line drawings of nearly all species, and a number of halftones. The book appears well adapted to the needs of all those who wish to identify accurately woody plants from the region concerned, and it further contains some original observations worthy of attention by the serious taxonomist.

ARTHUR CRONQUIST

HOUSE & GARDEN'S NEW COMPLETE BOOK OF GARDENS. By the editors of House & Garden with an introduction by Richardson Wright. 320 pages illustrated in color and black and white; indexed. Simon & Schuster, New York. 1955. $10

Material which originally appeared in various numbers of the magazine "House and Garden" during the years 1945-1955, have been compiled into an attractive and profusely illustrated (both color and black and white) volume. Diversified subjects are effectively treated — including lawns, trees, shrubs, roses, perennials, annuals, bulbs, fruits, vegetables; also rock gardens, wild flower gardens, city gardens, terraces, paths, and steps. This book would make a very nice gift.

ORCHIDS AS HOUSE PLANTS. Rebecca T. Northen. 122 pages, illustrated, indexed. D. Van Nostrand, Princeton, N. J. 1955. $3.50

This is a timely book for amateur gardeners who are interested in growing orchids as a hobby in their homes or greenhouses. They will find that it contains a lot of valuable information, answering many questions and problems that the amateur grower has to face.

The drawings that illustrate this book were made by Donald Wiest and contribute much to the book when it comes to demonstrating such work as making divisions and potting. There are also illustrations of various types of orchids, growth cycle of a cattleya, and other instructive drawings.

The author of this book is not only a writer but has studied orchids and grown them in her own home and under glass. Due to her own personal experience and observations the subjects are clearly written, thus making topics easily understood.

Some of the subjects mentioned in her book are: temperature, ventilation, humidity, watering, feeding, potting, pest control, diseases, care for orchids when growing them on a window sill or in an orchid case, kinds that do best in the home. This is, indeed, a book for the indoor gardener.

JOHN G. BORIN

HOW TO HAVE A GREEN THUMB WITHOUT AN ACHING BACK. Ruth Stout. 164 pages. Exposition Press, New York. 1955. $2.75

Of all the books I have reviewed which deal with gardening, this one seems to show the greatest enthusiasm for real outdoor work. The author is so embued with the love of growing things that nothing daunts her, and I am filled with admiration for her boundless energy and spirit. The early account of her trials and failures

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BOOK SERVICE
THE NEW YORK BOTANICAL GARDEN
Bronx Park, New York 58, N. Y.

NEWS, NOTES and COMMENTS

Flower Shows in the Conservatory. The New York Botanical Garden has planned a continuous floral display in the Conservatory until May. A colorful gardenesque exhibit is to be maintained, with seasonal emphasis at different periods. Chrysanthemums were featured from November 5 until the middle of December. Poinsettias, Christmas begonias, Christmas cherries, Christmas peppers, Cyclamen orchids, ferns, and other plants gave a festive air to the show houses during the holidays and through the first week in January. House plants will be featured next with special emphasis on begonias, of which the Garden has a fine collection.

Exhibits in the Museum Building. An exhibit in the Museum and Administration Building illustrates different tasks in putting the garden to sleep for the winter, and also work that can be carried on during the winter months. There are examples of winter protection, such as burlap covering for box, salt hay for evergreens, special mulches for roses, for perennials. Bird houses, feeding stations, and berried shrubs to attract birds to the garden are displayed. Within a show case there is a demonstration on forcing bulbs. This exhibit, "Putting the Garden to Sleep," was set up in the west wing of the Museum Building by the Special Display Committee of The New York Botanical Garden, with the assistance of Louis P. Politi, Head Gardener.

The Special Display Committee arranged the artistic exhibit, "Gazebos, Grottos, and Garden Ornaments," in the east wing of the Museum Building. The objects of art, loaned by the Cooper Union Museum for the Arts of Decoration, include rare and old books, etchings, fabrics, garden ornaments, and French bird cages of the nineteenth century. The latter have been loaned by Elinor Merrill.

These two museum exhibits will continue until the end of January.

The Garden's Display at East River Savings Bank. For three weeks in November, windows of the East River Savings Bank at 41 Rockefeller Plaza, New York City, contained an exhibit of The New York Botanical Garden. The exhibit was arranged by the Advisory Council with the assistance of the Special Display Committee and staff members of the Garden.

The Laboratory display consisted of cultures of microscopic plants (bacteria, yeast, and molds) growing in plates, tubes, and flasks. A few of the aspects of the research problems which concern these organisms and are being studied in our laboratories were illustrated. These include the isolation of antibiotic substances, i.e., materials produced by living organisms which inhibit the development of other organisms such as bacteria (anti-bacterial), viruses (antiviral), and fungi (antifungal). Methods for testing the products of molds for antibacterial and antiviral activity were illustrated.

Some of the commercially important microorganisms, such as the penicillia used in cheese flavoring, *Penicillium notatum,* from which penicillin is obtained, *Streptomyces griseus* from which *streptomycin* is obtained, and *Saccharomyces cerevisiae,* a yeast used in brewing, were also included.

In the Exploration Display, a relief map of Venezuela showed routes of exploration from 1944-55, particularly into the remote interior region of the Guayana Highlands.

Three specimens—*Kunhardtia rhodantha Phelpsiella ptericaulis,* and *Guacamaya superba* — represented new genera of a single plant family from the land of the "Lost World." Perhaps fifty new genera and considerably more than three thousand species new to science have been discovered in this area by contemporary work.

The Exploration Display also contained artifacts made by the Maguiritare and Guaica Indians. The gourd filled with curare was obtained from the Piaroa Indians. Exploration in such remote areas would be impossible without the help of indigenous Indians.

The Library Display included representative gems from the Library's collection.

Designs for the Pavillion at Brighton by Sir Humphry Repton, London, 1806. Sir Humphrey was the first to advertise himself as a "landscape gardener." It is said that his books created quite a stir in the early 19th century in England. His "before-and-after" views which illustrate his work are delightful contrasts and are eagerly sought by collectors.

Paradisi in Sole Paradisus Terrestris by John Parkinson, London, 1904. (From the edition of 1629.) A facsimile of the most important by far of all the 17th century gardening books. It is generally acknowledged to be the most beautiful gardening book in the English language. The dignified phraseology of that day makes for enjoyable and amusing reading.

The Natural History of Barbados by The Reverend Mr. Griffith Hughes, London, 1750. This quaint work was illustrated by the foremost botanical draughtsman of the 18th century, George Ehret. It was this artist who worked for many years with the great Linnaeus.

Wayside Gardens 1956 Introductions. One of the introductions to be offered in 1956 by Wayside Gardens, Mentor, Ohio, carries the rather cumbersome name of *Rhus cotinus foliis purpureus* 'Notcutt Variety.' It will more popularly be called 'Notcutt Purple Fringe.' The plant, which is of neat, compact growth, was a sensation when first shown in England where it originated, and was turned over to Wayside Gardens for introduction in this country under plant patent. The foliage is of a deep claret, and the feathery plumes of June and July are as rich in color as the foliage. Stock is limited.

Wayside Gardens recommends for the small or medium-size garden 'Sunburst' locust (Plant Patent No. 1313), as a graceful small tree, easily transplanted, hardy, and growing quickly in almost any kind of soil. The fern-like green foliage is bright yellow at the tips of the branches and creates an effect as if the tree were in bloom.

Exochorda macrantha 'The Bride' is described as a compact form of the pearl bush, bushy in habit and not over four feet in height. Drooping racemes of pure white flowers cover the shrub in late April and early May. Stock is still limited of 'The Bride' for which application has been made for a plant patent.

Campanula 'Wedgewood,' a 1956 Wayside introduction, forms a cushion of deep green leaves and bears brilliant violet-blue flowers.

Tenth Williamsburg Garden Symposium. The tenth anniversary symposium will be held in two three-day sessions. The first, "Bringing Your Garden Up to Date," will start March 7; the second, "Your Changing Garden," will start March 12.

Louis Bromfield, internationally known author and agriculturist, and Gilmore D. Clarke, landscape architect and former chairman of the National Commission of Fine Arts, will address the Gardeners' Banquets honoring two colonial Virginia botanists, John Curtis and John Clayton.

Special features of the tenth symposium include trips to "Shirley," the oldest James River plantation, owned and operated by the same family since 1660, and to "Berkeley," ancestral home of the Harrison family.

Fred W. Walters Perpetual Trophy. Pacific Rose Society members of Pasadena, California, have honored the founder of their society, Fred W. Walters, upon his election as president of the American Rose Society by establishing the Fred W. Walters Perpetual Trophy. This is a solid silver, three-handled, covered bowl mounted on an ebony base. It was offered for the first time at the 1955 Show of the Pacific Rose Society; the winners, Mr. and Mrs. J. J. Kenneally of San Diego, California, received the trophy at the Founders' Din-

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Right—*Exochorda macrantha 'The Bride'*

Below—Campanula 'Wedgewood'

CIRCULATING LIBRARY OF THE NEW YORK BOTANICAL GARDEN

We are delighted to announce that we are inaugurating a circulating library for the benefit of the members of The New York Botanical Garden. The following books are available to members only, for a free period of two weeks—thereafter there will be a 5c daily charge.

Members are expected to assume the cost of postage both ways. A small envelope will be provided in which to insert stamps to the amount of postage on the wrapping.

Books which you may desire to add to your own library may be obtained through Book Service of The New York Botanical Garden at the usual 10% discount to members.

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LET THERE BE HERBS

"Salt, vinegar, mustard, cider
How many legs has a spider?"

The above couplet is one of the many phrases which begin the count for little girls when jumping rope. One or the other of the two girls holding the length of clothes line, which makes the best kind of jump rope, may speed the whole process by turning "pepper." Such chants have typical female connotations, because boys are not expected or expert enough to skip rope. They do not seem to have the same coordination for the sport that girls are born possessing. Some day one of our researchers will publish a record of the folklore of jump rope chants. They are countrywide and often the same for generations with slight modernization or regional adaptations.

Mustard and vinegar-making afford an interesting chance to play variations on old themes with the help of dried herbs. Both mediums for seasoning winter salads and meat dishes take the addition of other strong flavors, such as garlic and shallots, well because they are used in small quantities. Herb vinegars and mustards can pep up home-made mayonnaise. Tarragon vinegar is the basis of tartare sauce, that most popular accompaniment to fried fish.

The best tarragon vinegar is made of the fresh herb infused in wine vinegar. It is possible to buy the commercial product, but it does not compare with your own creation. If you failed to put tarragon down in vinegar in June, it is not too late to remedy your loss. A small quantity can be made from the shoots of the herb which will spring to life quickly, if brought indoors during a January thaw. The roots need freezing, before forcing, but in mid-winter they may be dug and placed in a bulb pan with florists' potting soil. In a matter of weeks the plant will break out with fresh green leaves which can be snipped for seasoning; and when they get three or four inches tall, they are ready for vinegar-making. Fill a small glass jar with the herb, loosely packed. Warm malt or white wine vinegar slightly but do not boil. Pour over the herb to cover, and close up for fourteen days. The vinegar will be ready for use in this time if kept in a warm place.

Garlic Vinegar

Mash 4 cloves of garlic with 1 teaspoon of salt. Place crushed garlic and salt in a pint of red wine vinegar. Let steep two weeks and decant to a cruet.

Mayonnaise Made in a Blender

1 egg
2 tablespoons vinegar
½ teaspoon dry mustard
½ teaspoon salt
1 cup salad oil

Place egg, vinegar or lemon juice and seasonings and ¼ cup of oil in the container of an electric blender. Put on cover. Turn on and run 5 seconds. Add oil gradually and run for a few seconds after last oil is added. Turn off, stir down and add 2 teaspoons of boiling water. Run mixer again. For green mayonnaise fresh chervil, parsley, chives, and tarragon may be added in the beginning. A few sprigs of each can be put in the blender whole, and they will be chopped to a fine puree and give a beautiful green color. When using the mayonnaise for fish, tarragon vinegar may be added instead of plain vinegar. Aromatic mustard powder will give another variation as will garlic vinegar. Care must be taken not to use herbs, herb vinegar and herb mustard all in the same batch — it should be an either/or proposition.

Aromatic Mustard

Dry thoroughly and powder ¼ oz. each of thyme, garlic (garlic salt or powder may be used instead), tarragon, all spice and ½ of a bay leaf. Mix with 1 oz. of salt (unless garlic salt has been used) and 4 oz. of dry mustard. Blend in sufficient cider or malt vinegar to make a smooth paste. Store in the refrigerator.

GERTRUDE B. FOSTER

RHODOPHIALA **(from page 27)**

Dr. Walter S. Flory, Jr., Vice-Director of the Blandy Experimental Farm at Boyce, Virginia, where Mrs. Thelma L. Schmidhauser carried on her cytological work on chromosome determination on the narrow-leaved types of Amaryllis, gave the author of the above article the following account of the variation between the narrow-leaved and the broad-leaved types of Amaryllis which led to the segregation of the narrow-leaved ones into Rhodophiala by Dr. Traub:

"The essential thing . . . is that three differences show up; (1) the narrow-leaved forms have a different smaller number of chromosomes, (2) they have two or a few unmatched chromosomes, and (3) there are proportionately fewer short chromosomes in the narrow-leaved forms than in the wide-leaved forms as Amaryllis reginae, A. vittata, etc."

The title of Mrs. Schmidhauser's thesis was "Cytotaxonomic Studies in the Amaryllidaceae" (unpublished dissertation in the University of Virginia Library, Charlottesville, Virginia, 1954).

—The Editor

NEWS, NOTES, **(from page 30)**

ner on December 1, 1955, for their outstanding display of roses 'Charles Mallerin,' 'Eclipse,' 'Mme. Jules Bouche,' 'Girona,' 'Taffeta,' and 'Show Girl.'

"Ten Top Trees of Tomorrow"— In a panel discussion at a summer meeting of the New Jersey Association of Nurserymen, "ten top trees of tomorrow" were selected as a guide for the home owner, and as a guide to the grower to enable him to plan his planting operations to meet the demand.

Originally it was planned to list only ten trees, including major and minor shade trees, but the panel set up two lists of ten trees each. The final selection follows:

Major Trees
(fifty to sixty feet and more)

1. Honey locust *(Gleditsia triacanthos inermis)**
2. Pin Oak *(Quercus palustris)*
3. Norway maple *(Acer platanoides)**
4. Red maple *(Acer rubrum)**
5. Oriental plane *(Platanus orientalis)*
6. Sugar maple *(Acer saccharum)*
7. Red oak *(Quercus borealis maxima)*
8. Japanese pagoda tree *(Sophora japonica)*
9. Scarlet oak *(Quercus coccinea)*
10. Little-leaved linden *(Tilia cordata)*

Minor Trees
(twenty to fifty feet)

1. Columnar Norway maple *(Acer platanoides columnare)*
2. Hedge maple *(Acer campestre)*
3. Kwanzan Japanese flowering cherry *(Prunus Kwanzan)*
4. European mountain ash *(Sorbus aucuparia)*
5. American hornbeam *(Carpinus caroliniana)*
6. American hophornbeam *(Ostrya virginiana)*
7. White birch *(Betula pendula laciniata)*
8. Golden-rain tree *(Koelreuteria paniculata)*
9. Hopa crab apple *(Malus Hopa)*
10. Kobus magnolia *(Magnolia kobus)*

* Selected forms.

BOOK REVIEWS **(from page 29)**

is full of a delightful humor, and her story of the deal she made with a neighboring farmer for the precious manure she needed, ending with the gift of the cow bell when the manure producer finally died, was wonderful.

The sometimes controversial mulch theory of gardening is thoroughly discussed and should bring in converts. Surely the author has set forth enough proof that it works supremely well. This reviewer cannot speak from personal experience in that field, but wishes she lived near enough to the garden in Redding Ridge to enjoy its beauties and be on the receiving end of the author's bounty when there is a superabundance of garden-fresh corn to give away! What a delightful neighbor she must be! If I were younger, she would inspire me to begin to mulch.

LOUISE D. HOLTON
Essex Fells, N. J.

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Flora of the Prairies, and Plains of Central North America, by P. A. Rydberg. 969 pages and 601 figures. 1932. $6.

Plants of the Vicinity of New York, by H. A. Gleason. 284 pages, illustrated. A handbook especially compiled for the beginner. 1935. Second edition 1947. $2.

The Bahama Flora, by Nathaniel Lord Britton and Charles Frederick Millspaugh. 695 pages. Descriptions of the spermatophytes, pteridophytes, bryophytes, and thallophytes of the Bahamas, with keys, notes on explorations and collections, bibliography, and index. 1920. $6.25.

North American Cariceae, by Kenneth K. Mackenzie, containing 539 plates of *Carex* and related plants by Harry C. Creutzburg, with a description of each species. Indexed. 1940. Two volumes, 10¾ x 13½ inches; bound $17.50. Foreign postage extra.

Keys to the North American Species of Carex, by K. K. Mackenzie. From Vol. 19, Part 1, of *North American Flora.* $1.25.

Plants of the Holy Scriptures, by Eleanor King, with a check-list of plants that are mentioned in the Bible, each one accompanied by a quotation. Revised from the Journal of March 1941. 23 pages, illustrated. 1948. 25 cents.

Food and Drug Plants of the North American Indian. Two illustrated articles by Marian A. & G. L. Wittrock in the Journal for March 1942. 25 cents.

Vegetables and Fruits for the Home Garden. Four authoritative articles reprinted from the Journal, 21 pages, illustrated. Edited by Carol H. Woodward. 1941. 25 cents.

The Flora of the Unicorn Tapestries, by E. J. Alexander and Carol H. Woodward. 28 pages, illustrated with photographs and drawings; bound with paper. 1941. Second Edition 1947. Third Edition 1950. 25 cents.

Catalog of Hardy Trees and Shrubs. A list of the woody plants being grown outdoors at The New York Botanical Garden in 1942, in 127 pages with notes, a map, and 20 illustrations. 75 cents.

Succulent Plants of New and Old World Deserts, by E. J. Alexander. 64 pages, indexed. 350 species treated, 100 illustrated. Bound in paper. 1942. Second edition 1944. Third edition 1950. 50 cents.

Review of Juniperus chinensis, et al., by P. J. van Melle. A study of the many varieties and forms of *Juniperus* which have been commonly included in the concept of *J. chinensis.* 108 pages, illustrated, bound in paper. 1947. $2.00.

Periodicals

The Garden Journal of The New York Botanical Garden, bimonthly, designed to stimulate interest in the world of plants and the science of plant life, contains non-technical articles on botanical, horticultural and kindred subjects; also special departments — book reviews, questions and answers, news and comments. $2.00 a year, 35c single copy. Foreign subscription $2.50 a year.

Addisonia, devoted exclusively to colored plates accompanied by popular descriptions of flowering plants, 8 plates in each number, 32 in each volume. Published irregularly. Subscription price $10.00 a volume; not offered in exchange. Free to members of the Garden. Volume 23, No. 1 published November 5, 1954; Volume 23, No. 2, published November 6, 1955.

Memoirs of The New York Botanical Garden. A collection of scientific papers, issued irregularly. Vols. 1-6, to members of the Garden, $1.50 a volume; to others, $3.00. Vol. 7, to members, $2.50; to others, $5.00. Vols. 8, 9, $10.00.

Contributions from The New York Botanical Garden. A series of technical papers reprinted from journals other than the above, 1899-1933. 25 cents each, $5 a volume. List of separate titles on request.

North American Flora. Descriptions of the wild plants of North America, including Greenland, the West Indies, and Central America. 100 parts now issued. Now in a second series. Not offered in exchange. Prices of the separate parts on request.

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Mycologia, bimonthly, illustrated in color and otherwise; devoted to fungi, including lichens, containing technical articles and news and notes of general interest. Official organ of the Mycological Society of America. Now in its forty-eighth volume. Subscription $8.50 a year, single copy $1.75.

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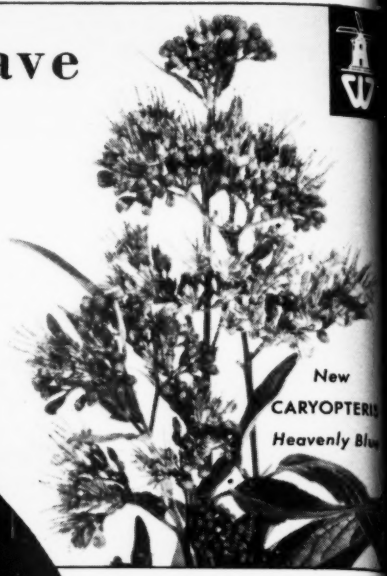

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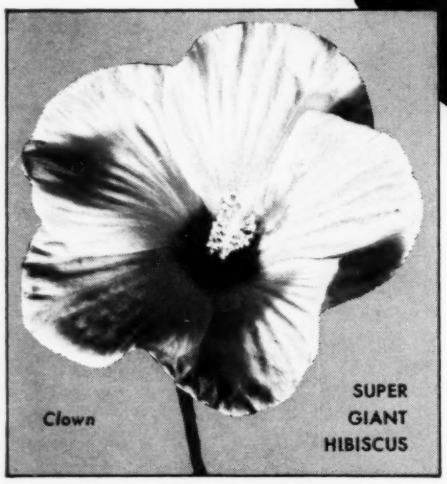

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